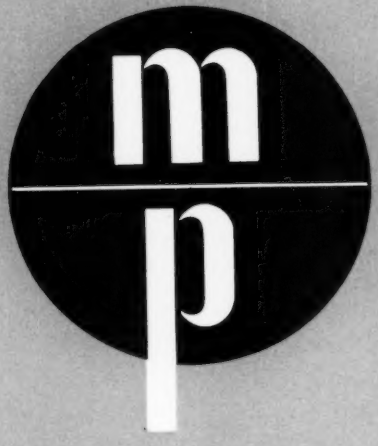
MODERN PLASTICS



FEBRUARY 1952

It pays to use your custom molder's know-how

says world's largest maker of 35 mm. cameras

No. 31 in a Series on Plastics Skill at Work...

PROJECT:
Longer wearing, better looking flash holder

CUSTOMER:
Argus Cameras, Inc.
Ann Arbor, Michigan

MOLDER:
Modern Plastics Corp.
Benton Harbor, Michigan

MATERIAL:
Durez black general-purpose phenolic plastic

MOLDED-IN THREAD is one of the many devices used by custom molders of Durez to keep cost down. These threads are accurate, need no machining, facilitate assembly. Mold is designed so that parting line does not cross threads. Glossy molded-in Durez finish makes it unnecessary to "trim" upper end of holder with second screw-on cap.

ONE-PIECE molded Durez camera body shows intricate form obtained with mass production speed.

One of many reasons why the Argus C-3 is America's most popular 35 mm. camera is its rugged one-piece body of molded Durez phenolic. After years of the treatment average picture takers give their cameras, the C-3 remains "like new" in performance and smooth, lustrous appearance.

Argus owners benefit from this molding even before they snap their first picture. With all undercuts, bosses, and lugs molded in, each piece is ready for rapid and accurate assembly without finishing...an obvious aid in holding down cost and assuring years of trouble-free operation.

Hence when Argus decided recently to replace the fiber flash holder, they naturally turned to their custom molders . . . and Durez plastics. The new holder needs fewer assembly operations. It looks better and has a firm, pleasing feel despite its light weight. Unaffected by moisture or changes in temperature, it is dimensionally stable . . . gives better service too.

The cost and time economies inherent in using Durez can be substantial "plus" advantages in your business. Plan now to apply the mechanical, electrical, and chemical properties of these plastics to your needs.

Your custom molder is at your command and by calling him in early you can use his specialized skill and facilities most profitably.

Durez field technicians are always available for counsel on your plastics problems.

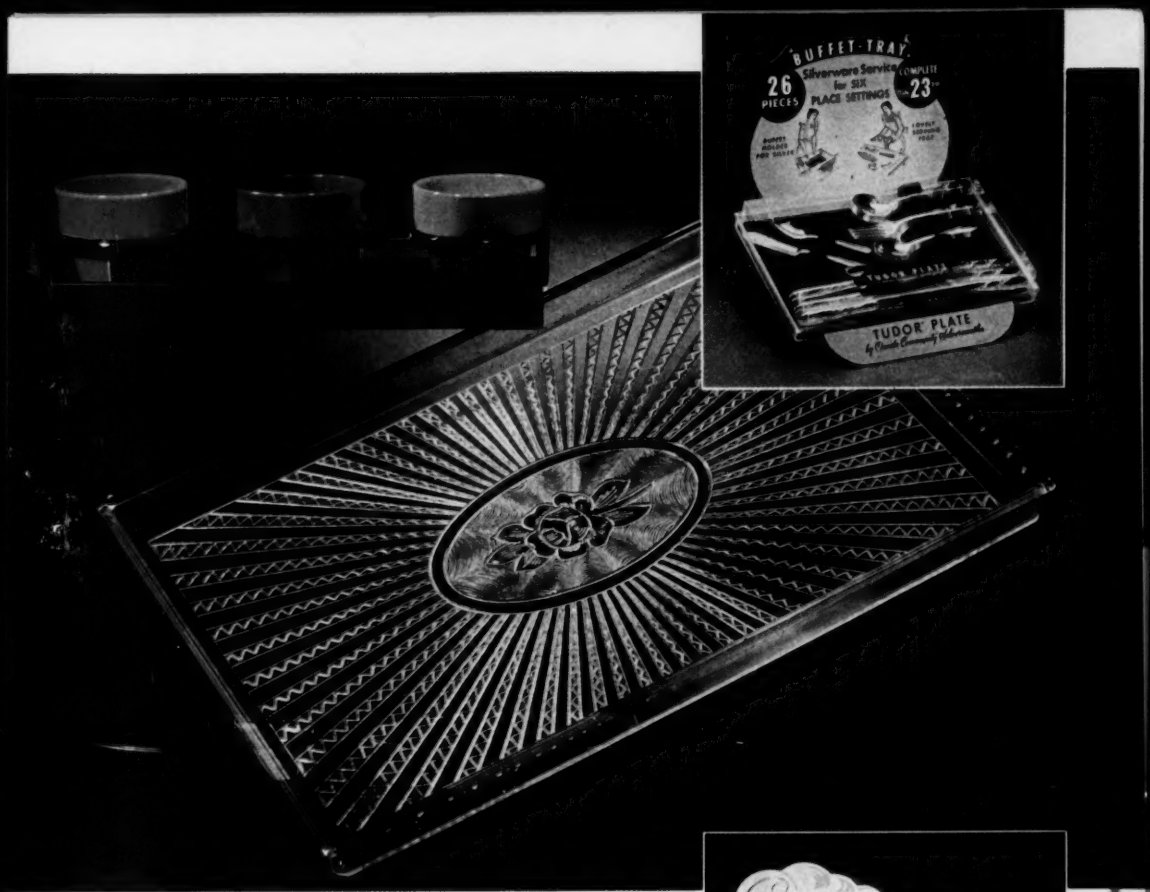
Our monthly "Durez Plastics News" will keep you informed on industry's uses of Durez. Ask us to send a copy regularly. Durez Plastics & Chemicals, Inc., 1202 Walck Road, North Tonawanda, N. Y.

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

PHENOLIC PLASTICS **THAT FIT THE JOB**



Oneida Community Silversmiths Feature Three "Guest Stars"

MOLDED OF *Catalin* STYRENE

Each plastic item, pictured hereon, as originally molded and marketed by Union Products, Inc. of Leominster, Mass., is a No. 1 attraction in its own field! Oneida Ltd's merchandising scouts, intent on staging a silverplate *show of shows,* spotted these numbers—recognized their talents—and lost no time headlining them in a triple feature *Community** and *Tudor* Plate* packaged display and re-use extravaganza that's box-office!

Thriftily accomplished, too . . . with lightweight, low-cost CATALIN STYRENE, and with NO mold investment! Check *your* molder . . . he might have on hand, a re-use winner for you!

**Trademarks of Oneida Ltd.*

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ONE PARK AVENUE • NEW YORK 16, N.Y.

CATALIN

CATALIN'S CHEMICAL FAMILY *includes* UREA, PHENOLIC, CRESYLIC, RESORCINOL, MELAMINE AND STYRENE RESINS

MODERN PLASTICS*

VOLUME 29 FEBRUARY 1952 NUMBER 6

CONTENTS

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*Reg. U.S. Pat. Office

NEED PLASTIC PARTS THAT CAN TAKE *PUNISHMENT*?

Do you have an application where toughness and resistance to shock are essential? Must the part withstand sharp impact? Must it resist the action of water . . . or oil . . . or chemicals?

If you're confronted with any or all of these problems there is a good chance that the right plastic materials can help you. For example:

(A) The washing machine agitator has to stand continuous mechanical stress in use. At the same time it must resist moisture and the chemical action of soaps and detergents. The specially formulated phenolic material yields outstanding performance.

(B) Here's a searchlight handle that must withstand sharp physical shock. The rubber phenolic material from which it is molded can really take it!

(C) This automotive brake plug is at times subjected to both physical shock and severe mechanical stresses. For this application, a canvas filled phenolic has proven highly successful.

(D) This distributor rotor withstands gear friction, ignition voltage, and the rugged service given every component in a farm tractor. Here again a phenolic plastic, properly chosen, does an outstanding job.

Getting the right material for the job is a big step in the success of any plastic application. And in choosing the one best material for the job, from the hundreds of materials and formulations now available, there is no substitute for experience.

For more than thirty-two years Chicago Molded has been solving problems like these—and hundreds of others—for many of America's largest users of plastics. That same seasoned know-how is available to you in perfecting the details of your plastic molding job. Chicago Molded's service extends to every step in the molding process—from design for molding through tool making, production, and finishing, down to the last detail of the molded component, ready for assembly into your product.

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and mail it to us. We'll put you on our mailing list to receive "Plastics Progress", an interesting and informative publication containing articles about current plastic molding jobs as well as other factual data of value to the user of plastics. There's no charge or obligation.

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EDITORIAL

Let's Set Those Film Standards NOW!

At the recent S.P.I. Film and Sheeting Conference, some progress was reported on setting standards for vinyl products.

Some—but not enough!

Here is an industry which stepped up its sales—from a few million yards in 1946 to over a billion yards in 1951—by a program of product improvement and powerful merchandising. Yet here is an industry which, after building such a magnificent record, so suffers from fear today that there is literally no correlation of price, thickness, or quality in the merchandise it offers.

A recent testing program on vinyl film products, covering shower curtains, aprons, garment bags, raincoats, yard goods, and other items, revealed one of the messiest conditions imaginable. The majority of the film products offered were of good quality and well made, but even these suffered from such poor labelling that the consumer would have no way of appreciating their good properties before using them. In many cases there was no labelling indication of what service to expect from the product or what care to take of it, and no information on who made the film.

The natural result of this condition in a market where there is sales resistance (as there certainly is today) is to let the lowest common denominator in the field drag the whole industry down to its level.

We MUST have film standards—NOW!

The problem is essentially simple, and the cure requires just one main thing: character. The Society of the Plastics Industry has offered a four-point program involving industry minimum standards, informative labelling, buyer as well as public education, and trade rules. The Industry's committees have laid the ground-work, and all that remains before establishing the standards is to secure agreement at technical level on the test methods.

It is recognized that we can only go so far in simplifying. Gage alone as a determining factor of quality is out; in testing film bought on the market, no relationship could be established between thickness and strength of film from 1.8 mils to 4 mils in thickness. There are also the matters of light stability and resistance to shrinkage. In certain applications, there is the further matter of flammability. In the case of products made of embossed film or sheet, the gage before embossing is important.

For each application—draperies, garment bags, shower curtains, tablecloths, rainwear, etc.—there must be a minimum standard set which is acceptable to the whole industry.

The movement has bogged down on the fadeometer tests, where no general agreement has been reached on the validity of the test or the duration of the test.

This disagreement must not be permited to impede the progress of the industry. If no other generally acceptable test for light resistance is available, we must use the fadeometer method—and make the duration of the test long enough to prove quality. If a better test is available, then the technicians should accept it and adopt it.

Every day that agreement on minimum standards and test methods is delayed, more ground is lost, more future sales are lost, and more later public relations problems are created.

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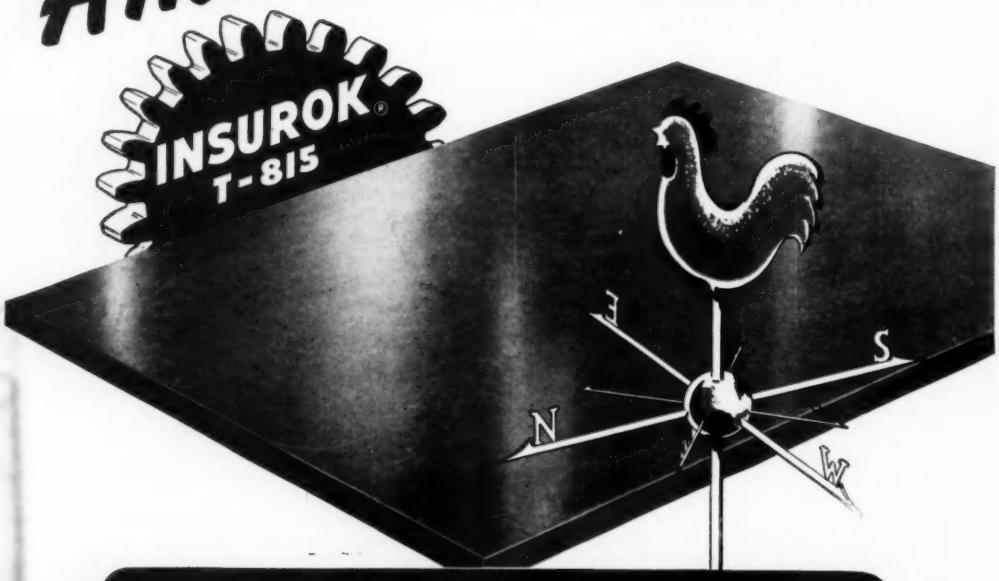
A New REINFORCED LAMINATE For Gears and Mechanical Parts



Provides UNIFORM STRENGTH IN *ALL** DIRECTIONS

Plus . . . Smooth Mechanical Finish . . . Good Electrical Properties

Its reinforcement is different! . . . that's why this new material provides such a unique combination of properties.

Instead of woven fabric, new INSUROK T-815 is reinforced with unwoven cotton fibres, random-laid in the form of a mat. Thus, it exhibits high uniform strength—in the main direction, cross direction, and *all intermediate angles!* This property is valuable in gears and other mechanical components, where teeth or other sections must have equal strength.

But Grade T-815 has more than uniform strength. Its electrical properties are good, and it machines well to smooth, clean surfaces, with finish and texture superior to any cotton fabric-base laminate made. Furthermore, T-815 can be punched—hot or cold, depending upon the thickness—making it valuable for thin electrical parts requiring high strength.

Investigate new INSUROK T-815 for your product, today.

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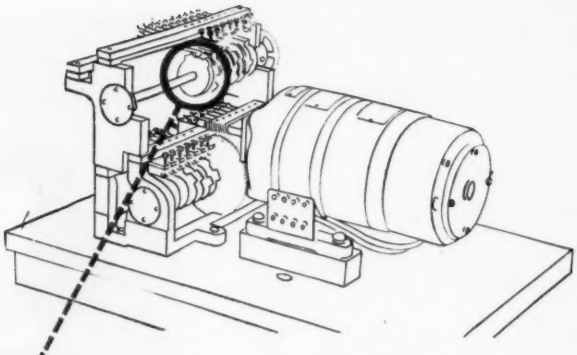
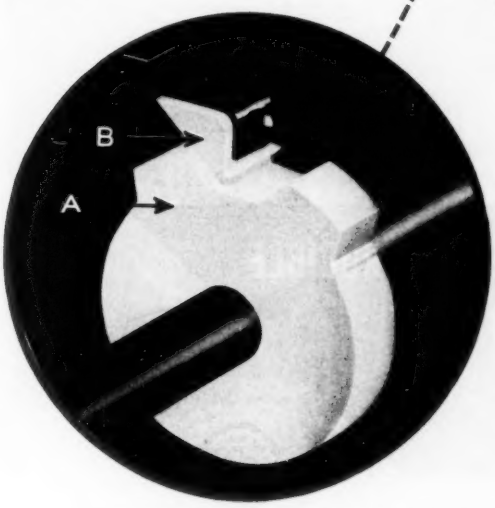


Cams of Du Pont nylon plastic wear longer

provide more accurate timing in telephone interrupters



NYLON CAM (a) is mounted on a shaft, driven by an electric motor. This turns slowly—from ½ to 15 r.p.m. Each cam bears specific contours which determine signals. When cam is pressed against nylon insert (b), the circuit closes, providing desired signal. Nylon parts molded by Victory Plastics Co., Hudson, Mass., for Holtzer-Cabot, Boston.

These revolving cams of Du Pont nylon plastic regulate the timing of busy signals and coded rings for your telephones. They do this by pressing against, then releasing, a nylon insert on a spring, which, in turn, closes and opens an electrical circuit. The nylon parts replace an intricate metal assembly, providing Holtzer-Cabot, the manufacturer, with interrupters that perform more accurately, last longer.

The nylon cam is supplied by the molder in the form of a blank, injection-molded to standard inside and outside diameters. The contours are then machined to meet signal requirements of individual exchanges. This vastly simplifies the manufacturing job, since the former part involved about 40 machining operations.

Smooth performance of the nylon parts gives more accurate control of timing pulses, measured in hundredths of seconds. What's more, they showed no sign of wear after accelerated tests equivalent to 3½ years of normal service. These tests indicate that new units with nylon cams and inserts will far outlast former assemblies.

Du Pont nylon plastic is finding many uses as an engineering material. It may pay you, as it did Holtzer-Cabot, to investigate its properties for future application.

For additional information on nylon and other Du Pont plastics, write:

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Polychemicals Department, District Offices:
350 Fifth Avenue, New York 1, New York
7 S. Dearborn St., Chicago 3, Illinois
845 E. 60th St., Los Angeles 1, California

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REG. U.S. PAT. OFF.
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...THROUGH CHEMISTRY
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PLASTICS • CHEMICALS

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CRUCIBLE MOLD STEEL TOOL STEEL

It means a lot to you that mold steel and tool steel are one-and-the-same at Crucible.

Our tool steel has an outstanding reputation, the result of years of experience and highly specialized handling.

Crucible mold steel benefits from our vast experience with other tool steels. That's why they are consistently chosen for the most exacting molds. Actually Crucible mold steel *is* better. It's *tool steel* – and it's available from stocks from 13 warehouses strategically located from coast to coast.

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Get your copy of the unique Crucible Tool Steel Selector — a quick twist of the dial gives you the right tool steel for the right machining job. Selector has 9-inch diameter; printed in 3-colors.

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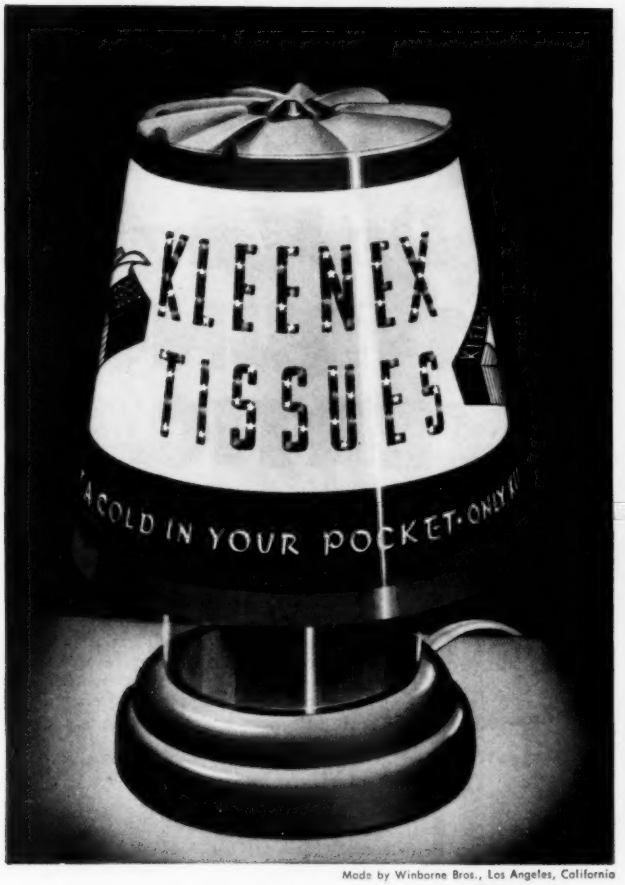

Made by Winborne Bros., Los Angeles, California

are you up-to-date on acetate?

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FOR DISPLAYS

. . . display men economize on Acetate's toughness use thinner gauges in 7 out of 10 cases

What is your display problem: a heat-propelled lamp shade, shoe form, illuminated clock, replica of a product, translucent sign? Celanese *acetate* sheeting will give you better results every time —and at lower cost!

Celanese *acetate* is tough . . . can be used in thinner gauges and give you economies in material and fabrication costs. It is available from stock in a full color range--in rolls and cut-to-length sheets.

*Reg. U.S. Pat. Off.

The new Celanese acetate booklet is now on the presses. Reserve your copy now by writing to: Celanese Corporation of America, Plastics Division, Dept. 101-B, 180 Madison Avenue, New York 16, N. Y. In Canada, Canadian Cellulose Products Limited, Montreal and Toronto.

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DE MATTIA 4-OUNCE VERTICAL

This highly efficient vertical injection molding press is designed so that it can be used for compression and transfer work by making a few low cost additions. All hydraulic, it features smooth fluid power for both injection and mold clamping operations.

DE MATTIA VERTICAL MODEL G1

SPECIFICATIONS

Ounces Molded per Shot — 4 (Styrene) • Pounds of Plasticized Material per Hr. — 50 • Capacity of Feed Hopper (Lbs.) — 50 • Diameter of Injection Plunger — 1⅞" • Diameter of Hydraulic Injection Cylinder — 8½" • Pressure on Material — 20,500 lbs. per sq. in. • Size of Die Plates — 14" x 23" • Mold Opens — Stroke — 15" • Max. Daylight — 19" • Min. Die Space — 4" • Motor — 20 HP @ 1,200 RPM • Pump Capacity — 54 GPM @ 1,000 PSI • Mold Closing Pressure (Tons) — 150 • Floor Space Required — 47" x 59" • Height Over All — 108" • Approximate Wt. of Machine (Tons) — 4¼" • Injection Piston Stroke — 7¼" • Closing Cylinder Bore — 8 1/16" • Complete Injection Time (Max.) — 1.88 Sec. • Heating Cylinder — 4,350 Watts.

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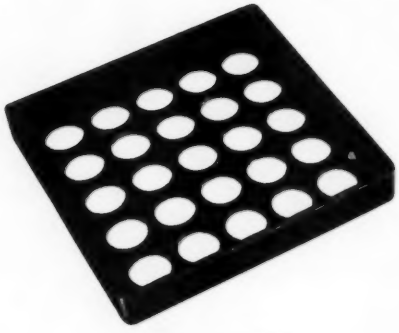
RUGGED TOTE TRAY *Cradles* PRECISION PARTS THROUGH PRODUCTION



MOLDED OF ROGERS CORPORATION PHENOLIC

FOR SARGENT & CO.
BY TEAL MOLDING CO., INC.

Better Parts for Better Products

ROGERS
CORPORATION
Established in 1832

This tote tray, molded of Rogers RX 429, an impact phenolic molding compound, gets slammed around . . . immersed in hot water . . . exposed to steam blasts. Frequently, it's on the bottom of a stack of similar trays totalling 1122 pounds of parts.

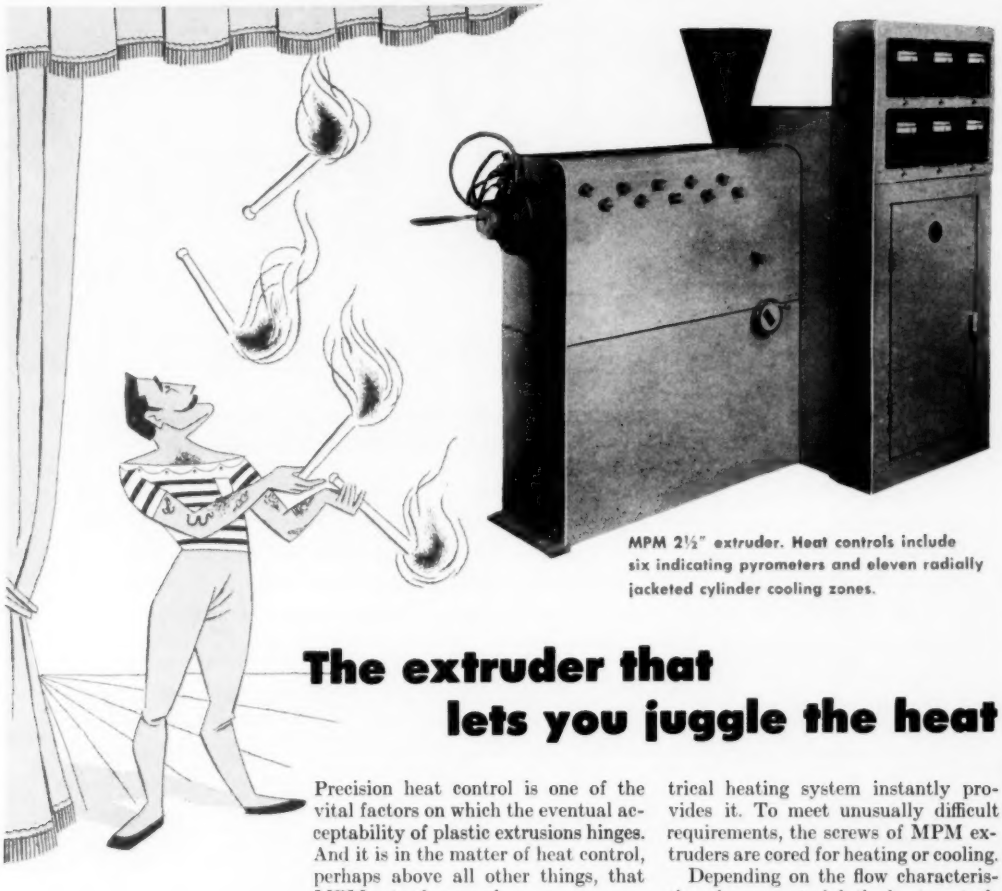
Sargent uses these trays to carry precision brass parts with external threads which must be protected. RX 429 was specified because it could take the harsh treatment and yet not nick the threads. Teal Molding Company, Inc. approved this choice of material because it can be automatically preformed, has a fast rate of cure, and is clean and dustless.

Perhaps you have a problem requiring a high strength material. Our phenolics have demonstrated repeatedly that high strength parts can be obtained at low unit cost. For more details on our materials, please write to Dept. P, Rogers Corporation, Manchester, Conn.

Trays nest compactly and securely, simplifying handling during secondary machining operations. Trays stand up to repeated stacking and unstacking without chipping, cracking or breaking.

Start of hot-water detergent bath. Toughness of Rogers RX 429 is attested by the fact that trays go unscathed through repeated washing operation.

Note how compactness and strength of trays reduces storage space required for parts. Bottom trays each support 1122 pounds.



MPM 2½" extruder. Heat controls include six indicating pyrometers and eleven radially jacketed cylinder cooling zones.

The extruder that lets you juggle the heat

Precision heat control is one of the vital factors on which the eventual acceptability of plastic extrusions hinges. And it is in the matter of heat control, perhaps above all other things, that MPM extruders excel.

The man who operates an MPM extruder commands an extremely flexible heat exchange system. Thanks to MPM's multi-zone cooling (with from 9 to 15 cooling zones, depending on extruder size), he can progressively raise the temperature of his compound as it proceeds from the hopper, so that it reaches the die at exactly the right extrusion temperature. If too much frictional heat develops at any point, the fact is immediately indicated on the control panel, and a simple valve adjustment compensates. Should more heat be needed, MPM's efficient electrical heating system instantly provides it. To meet unusually difficult requirements, the screws of MPM extruders are cored for heating or cooling.

Depending on the flow characteristics of your material, the heat controls of your MPM extruder can be adjusted to deliver precision extrusions at creditable rates. This is most important in view of the rapid advancements being made in materials' development.

When consideration is given the other MPM advantages — solid corrosion resistant interior parts, simplified installation, built-in speed indicator, ample vari-speed drives — you can see why MPM extruders are favored the world over. For additional information and for help in determining the proper size MPM extruders for your job, write today.

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BEHIND The Story of STANDS THE W-S "Completeline"...

THE SHORTEST DISTANCE BETWEEN PRODUCTION AND PROFIT

In a fast-paced industry like that of plastics molding, news becomes history almost over night. Only a few years ago, W-S was pioneering the "big" injection machines—eight, then 12, then a fabulous 16 ounces! Now, Watson-Stillman's high-speed production giants—the size of small locomotives — shoot almost 20 *pounds* per cycle.

Yes, plastics molding has come of age. What started only yesterday as a manufacturing business has become a major industry . . . its applications tested and proved . . . its markets huge and growing . . . its materials and products pronounced "critical" in the most vital fields of civilian and defense production.

W-S is proud of its right to claim an associate editorship in the "writing" of this typically American success story—the encyclopedia of plastics molding. We have worked closely with its chief editor—the molder himself—in developing the most complete line of production machinery anywhere available.

Always reflecting, and frequently anticipating the molders' needs, W-S has developed machinery ranging from one to 300 ounces capacity, and including complete installations for every material and method commercially employed in molding by compression, transfer, and injection techniques.

This kind of close association with the beginning, development, and assured *future* of the industry makes W-S more than ever your logical first-choice consultant on your present expansion or new-plant planning.

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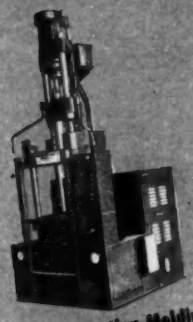
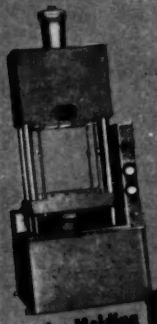


Vertical Injection Molding Machines 1, 2, 4 and 6 oz.

2 oz. Semi-Automatic Injection Molding Machine.

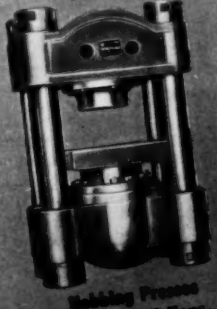


Transfer Molding Machines 30 to 1200 Tons.

Preform Tableting Machines 10 and 100 Tons.

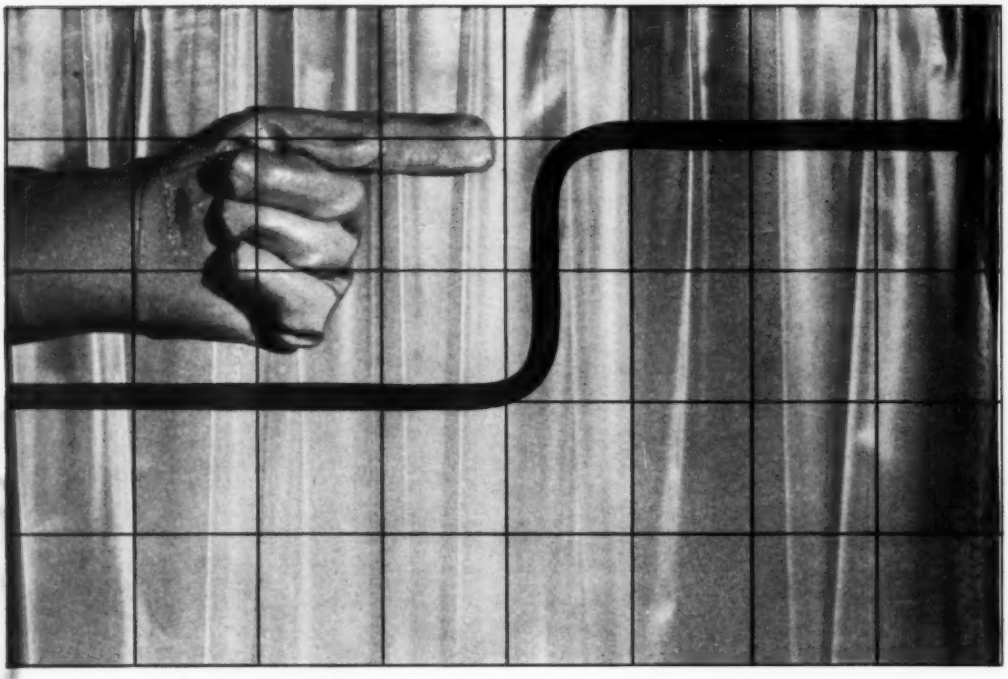
W-S 300 oz.
Injection Molding Machine
Die space 48" x 72" — Clamp 1500 Tons

Compression Molding Presses—50 to 1200 Tons.



Molding Presses 200 to 3000 Tons.

Horizontal Injection Molding Machines—4 to 300 oz.



HOW TO GET 33% TO 100% MORE VINYL PRODUCTION FROM YOUR EQUIPMENT

You can increase your output of extruded and calendered polyvinyl chloride products, without adding machinery, by the use of Monsanto's fast-fusion type plasticizers—Santicizer 141, Santicizer 140 and Santicizer 160. Production increases generally are 33%, but in some cases they go up more than 100%.

This extra volume can be yours without sacrificing quality. In fact, you can get *better* quality. You may add advantages such as flame resistance, low toxicity, improved low-temperature flexibility, grease-and-solvent resistance and other characteristics that will improve your sales.

For information on these production-boosting, cost-cutting, quality-building Santicizers, contact the nearest Monsanto Sales Office or write for a copy of Monsanto's new booklet, "*Increased Capacity Through Faster Processing of Polyvinyl Chloride.*" MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Mo.

Santicizer: Reg. U. S. Pat. Off.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Canada Limited, Montreal.

SANTICIZER

MONSANTO
CHEMICALS—PLASTICS

You are cordially invited to visit the Monsanto Exhibit, Booth 222, at the Fifth National Plastics Exposition, Convention Hall, Philadelphia, March 11-14, 1952.

SERVING INDUSTRY...WHICH SERVES MANKIND

Want the right answer to your plastics problem?

You're on the right track to the right answer when you call in Kurz-Kasch first—one of the largest and most experienced moulders of thermosetting plastics in the country. All we need to help you is your inquiry on the plastic moulded part *you* need. And if you'll use this check list to prepare that inquiry, you'll be helping us to help you more quickly. Here it is:

- ☐ If you're in a hurry for a price, will an *approximate* price do? If so, please state. Most moulders are pretty fair at guessing, but hate to hang their hats on such guesswork.
- ☐ If it's a *firm* price you want we'll need a little more time. Average estimates cost us about $35.00 and there will probably be many requests ahead of yours. But your estimate will reach you sooner, and your prices will be more attractive, if you are *specific* and follow these rules:
- ☐ Be sure blueprints are legible.
- ☐ Relax tolerances wherever possible. (Circle those dimensions which *must* be held.)
- ☐ Advise how the part will be used and show its next assembly, if possible.
- ☐ State the material required if you know it. If not, give information on heat requirements, color, moisture and chemical resistance, impact, electrical or tensile requirements.
- ☐ How large a mould is required? What will be your ordering requirements? How many parts will you use per year? How many years do you estimate the item will be active?
- ☐ How much finishing is actually required on the part?

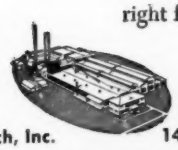
  Must the gate be ground flush?

  Will a tumble finish suffice for flash removal?

  Will the ultimate consumer actually see the part or any particular portion of the part?

  What finishing on this part will be done in your plant?
- ☐ If inserts are required, who is to furnish them? Send blueprints of inserts. Advise if plastic flash must be removed from inserts.
- ☐ Is a model or sample part available? Can we see it?
- ☐ Are suggestions for minor changes in design acceptable?

You'll get the right price for the plastic part that's right for the job in every way if you'll follow this check list. And if the part you need calls for thermosetting materials that can be compression, transfer or plunger moulded, you'll get the right supplier with the right facilities if you pick Kurz-Kasch. We're ready when you are.



Kurz-Kasch, Inc. **1415 South Broadway • Dayton 1, Ohio**

Branch Sales Offices: New York, *Lexington 2-6677* • Rochester, *Hillside 2415M* Chicago, *Harrison 7-5473* • Detroit, *Trinity 3-7050* • Philadelphia, *Granite 2-7484* Dallas, Logan *1970* • Los Angeles, *Richmond 7-5384* • St. Louis, *Delmar 9577* • Toronto, *Riverdale 3511* • ***Export Office:*** 89 Broad Street, New York City, *Bowling Green 9-7751.*

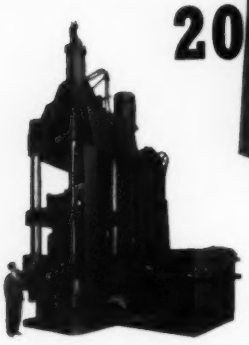
Kurz-Kasch

FOR OVER 38 YEARS PLANNERS AND MOULDERS IN PLASTICS

JACKSON & CHURCH

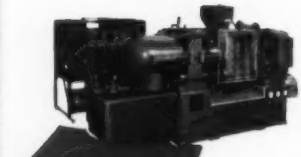
pre-plasticizing presses . . .

meet industry's critical plastics molding needs!



200 oz

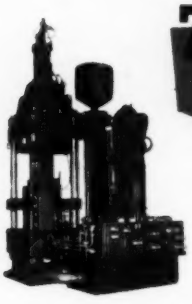
molding machine with a ca-
00 pounds of styrene per hour
ng basis, utilizing the Hendry
kes possible the molding of
avier plastic products. Util-
eat in conjunction with re-
supply constant viscosity
material to the injection chamber. More projected area per ton clamping pressure . . . more strain-free moldings . . . less scrap. Injects uniformly plasticized material directly into mold without torpedos, auxiliary plungers and other supplementary devices. Potential capacity: 300 oz. at 45 second cycle with substitution of 300 oz. chamber.



16 oz

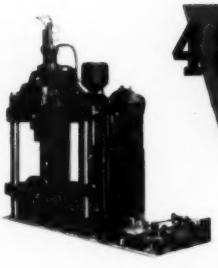
The result of extensive research and experimentation on the J-C horizontal press features such famous J-C design features as variable pitch screw, multi-stage metering screw, single zone injection chamber holding 17 oz. of constant-temperature viscous material, and hydraulically operated injection ram.

Plasticizes 180 pounds of styrene per hour with pressure exerted on the material in the injection chamber of 14,000 p.s.i. Locking pressure on the clamp is 225 tons.



72 oz

Pre-plasticizes over 410 pounds of styrene per hour. Produces 700 square inches of shot area** . . . 40 second cycle . . . tons locking pressure. Pre-plasticizing member has four temperature controls with specially designed stainless steel hopper and extruder pump. Has water-cooled thrust bearing and leak-proof lubricant seals, as well as standard coupling and gear boxes for easy maintenance.



48 oz

Shoots 500 square inches of projected area** in 60 cycles.

Versatile, high-one press operates at lower injection pressures for substantial weight savings. Shots can be made in 30 second cycles from 48 ounces to 6 ounces. Has coloring advantages of larger presses.

* Patents applied for

** Dependent upon part design, mold design & material

Hendry PRE-PLASTICIZING PROCESS J-C

A PRODUCT OF

JACKSON & CHURCH CO. • SAGINAW, MICHIGAN

WORK WELL DONE SINCE '81

are used in the manufacture of high grade

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ERINOID LIMITED • STROUD • GLOUCESTERSHIRE

Any way you figure it...

It's the FINISHED COST that counts!

SURFEX® MM can give your vinyls all these advantages—at no greater cost than for water-ground limestone:

- **BETTER LIGHT STABILITY**
- **REDUCED MIXING TIME**
- **LESS WEAR ON DIES**
- **CONTROLLED CHEMICAL ANALYSIS**
- **LOW IRON CONTENT**

Check the pound/volume comparison at right to see how SURFEX MM, a controlled quality precipitated calcium carbonate, can help you lower vinyl compounding costs and increase batch yields with no sacrifice in quality.

Write for your copy of "The Application of Inert Fillers in Vinyl Plastics".

YOU GET ALL OF SURFEX MM's ADVANTAGES AT NO EXTRA COST			
	COST LB	RECIPE	
PVC RESIN	$0.38	100	100
DOP	.42	57	57
SURFEX MM	.0185	35	—
W-G Limestone	.009	—	34
Stabilizer	.57	3	3
Lb. / Volume Cost		45.2c	45.2c
Durometer Hardness	—	85	85
Tensile	—	2400 psi	2200 psi
Crescent Tear	—	400 lbs. inch	350 lbs. inch

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also, representatives in other principal cities.

DIAMOND DISTRIBUTORS: C. L. Duncan Company, San Francisco and Los Angeles; Van Waters and Rogers, Inc., Seattle and Portland, U.S.A.; Harrison and Crosfield, Montreal and Toronto, Dominion of Canada.

DIAMOND SURFEX FOR BETTER VINYLS

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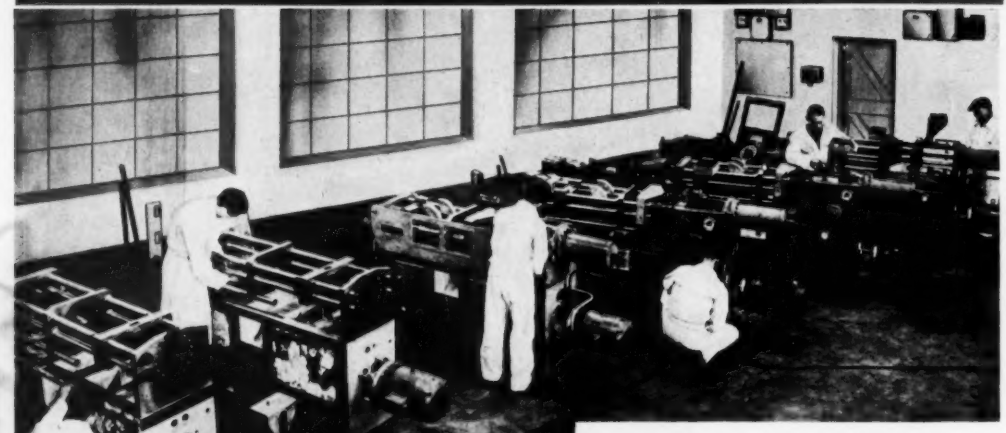
DIAMOND ALKALI CHEMICALS ®

Windsor

PRECISION BUILT PLASTIC MACHINES



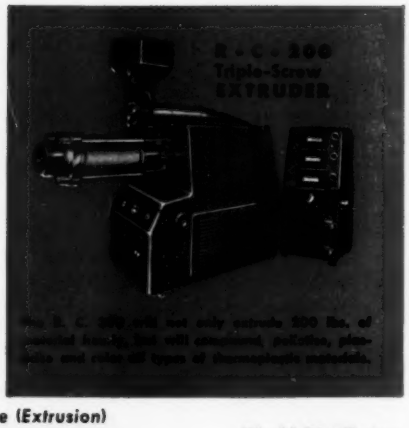
Assembly Line of S • H • 3 Plastic Injection Moulding Machines

New Factory Extensions to meet World-Wide Demand...

To step up production in order to keep pace with delivery time schedules, R. H. Windsor Ltd. have just completed their new factory extensions at Chessington, Surrey, England.

The growing demand throughout the world for their famous R. C. Series of multi-screw Extruder Compounders is because, unlike ordinary extruders, all three (65 lbs., 100 lbs., and 200 lbs.) are able to perform four separate functions . . . compounding, extruding, coloring and reclaiming scrap.

The R. C. 65 and the R. C. 100 employ two interpenetrating screws, but the high capacity R. C. 200—which can simultaneously compound, color and extrude at better than 200 pounds per hour—has three! Simple to operate—exceptionally versatile—low in operating costs and power consumption. Full details of each model sent on request.



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Emphasis on Technology

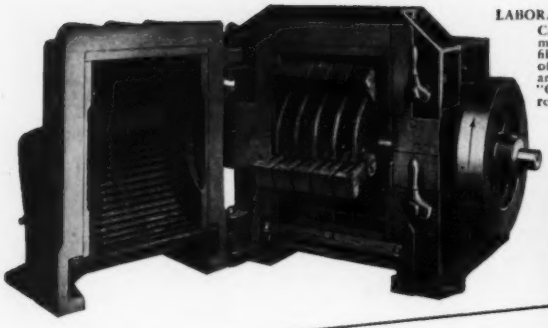
Like the SPE, we realize the importance of discussing technical problems vital to the plastics industry. That's why Plastics Engineering Co. conducts constant, though unpublicized, research and study toward the betterment of Plenco Phenolic Molding Compounds.

This program supplements laboratory work with visits to leading molding companies for talks with management and their shop men. Result: an ever-growing knowledge of the varied applications in the molding process, and a practical development of finer phenolics by Plenco.

Why not discuss your next phenolic molding problem with a Plenco engineer. He will suggest a Plenco Phenolic perfectly suited to the job. This is true whether you need a general purpose material, or a compound with impact strength, heat resistance or properties for deep drawing of large castings. There are also mottles, colors, and a wide variety of other Plenco Phenolics to meet your most exacting requirements. *Drop us a line for further information.*

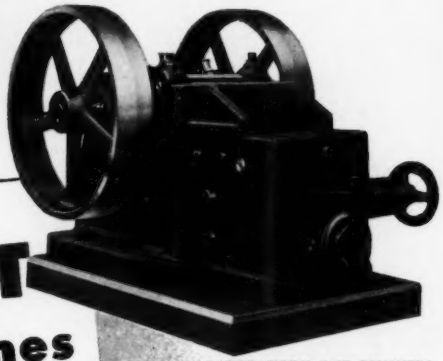
PLASTICS ENGINEERING COMPANY

Sheboygan, Wisconsin



LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



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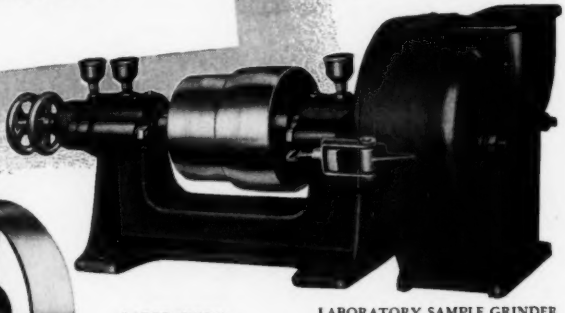
Laboratory Machines

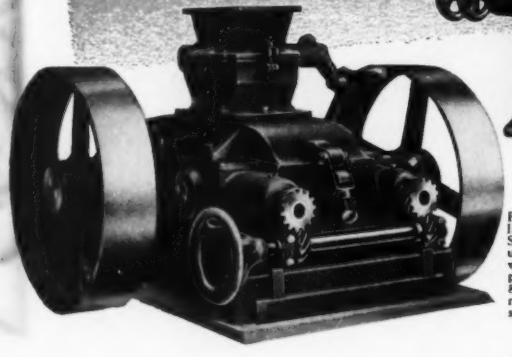
Assure Quality of Products

Fast - Economical - Accurate

LABORATORY JAW CRUSHERS

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.





LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from ½ in. to 20 mesh — and for the 12 x 12 size from ¾ in. to 20 mesh.

LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

The only sure way to maintain strict quality of products is laboratory control . . . and that calls for accurate sampling.

Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

Investigate Sturtevant equipment for your laboratory. It will cut your sampling costs . . . help maintain strict quality of products . . . increase sales. Write for complete details and catalog.

STURTEVANT MILL COMPANY

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Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

save 10%-15% plasticizer with PLIOVIC

EVERY tenth drum of plasticizer is a bonus you save with PLIOVIC — Goodyear's vinyl chloride copolymer. That's because internally plasticized PLIOVIC needs from 10% to 15% less plasticizer for equal modulus.

With PLIOVIC — in organosols, plastisols or general vinyl use — you get other desirable characteristics, too, such as lower processing temperatures, faster mixing and the ability to load more highly.

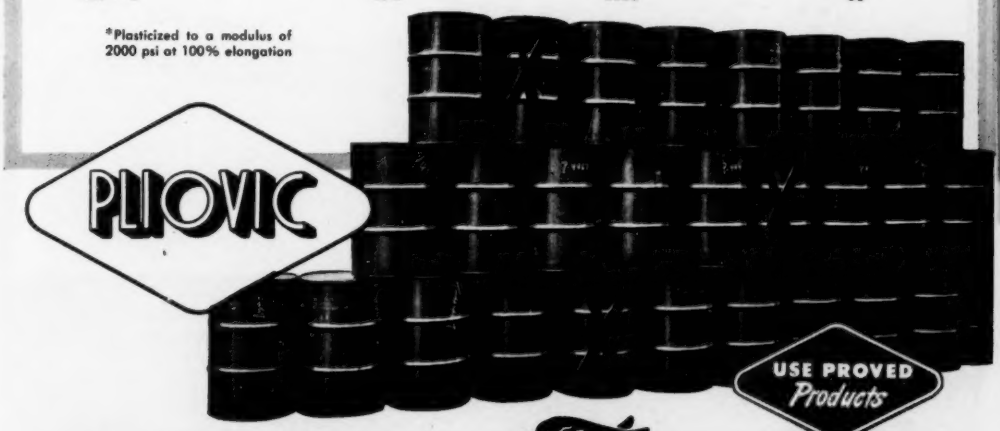
So turn to PLIOVIC — turn out high quality vinyls with strength and hardness comparable to those you are getting with your present resin—and save on scarce, costly plasticizer. Write today for full details and samples to:

Goodyear, Chemical Division
Akron 16, Ohio

Here's proof—
Maintained Quality — Reduced Use of Scarce, Costly Plasticizer

Resin	Plasticizer per 100 parts resin*	Ultimate Tensile	Average Hardness Shore B @ 78°
PLIOVIC	**40.5**	**3000**	**67**
Resin "X"	47.0	3100	65
Resin "Y"	46.0	3350	65
Resin "Z"	45.5	3000	68

*Plasticized to a modulus of 2000 psi at 100% elongation



GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD" – Every Sunday – ABC Network

Pliovic—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Low-cost BIPEL group drive cuts operating costs

The BIPEL system of driving a group of presses from a simple, medium pressure pumping unit depends on two novel BIPEL units: the unloading valve and the 2-ratio intensifier fitted to each BIPEL press. *

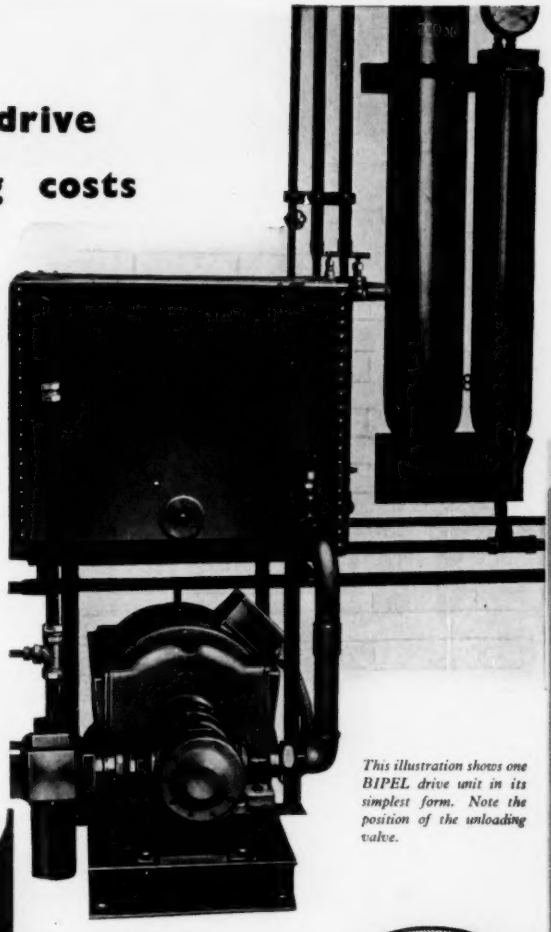
The drive unit (see diagram) consists of a rubber bag accumulator (the bag isolating the gas from the oil) with an extra gas bottle to increase the working capacity. The rest of the circuit consists of a vane pump, motor, unloading valve, tank and filters.

The pump pressure is reduced to zero when the circuit pressure rises to, say, 1050 p.s.i.— the fluid already pumped being locked in by a check valve. When the pressure drops to, say, 950 p.s.i., the pump is again put in circuit.

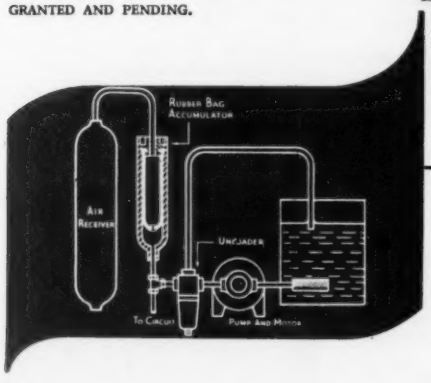
The unloading valve works on a novel principle, both unloading and loading pressures being adjustable during operation.

The valve cannot fail to relieve the pump, thus no extra safety valve is necessary.

*BRITISH AND FOREIGN PATENTS GRANTED AND PENDING.

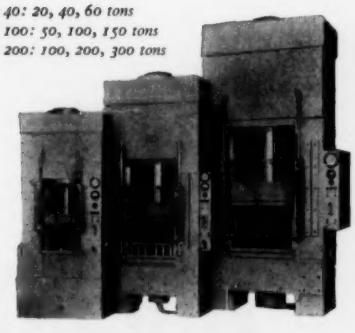


This illustration shows one BIPEL drive unit in its simplest form. Note the position of the unloading valve.



B·I·P GROUP

Type 40: 20, 40, 60 tons
Type 100: 50, 100, 150 tons
Type 200: 100, 200, 300 tons



BIPEL presses are made in three models, each affording three molding pressures

B.I.P. ENGINEERING LTD., ALDRIDGE ROAD, STREETLY, STAFFS., ENGLAND

It Pays to Fabricate Lucoflex

There's a big demand in the chemical processing industry for equipment made of this resistant rigid vinyl plastic

Because equipment made of Lucoflex rigid polyvinyl chloride plastic is inert and completely non-reactive towards most acids, alkalies, mineral salts and other chemicals, it is rapidly becoming the preferred material for applications where corrosion has always been a problem.

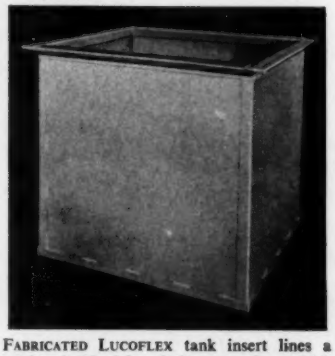
Lucoflex can withstand temperatures up to 170° F. without softening and, thanks to its highly resistant nature, performs ideally where other rigid plastics cannot do the job. Up to now, if plastics could not fill the bill, the only satisfactory answers often were fragile glass or ceramics, or costly stainless steel or Monel.

As a result, manufacturers who use corrosive chemicals in their processing are specifying containers, piping, sinks, condensing coils, hoppers, hoods and other equipment made of Lucoflex.

These units last and last. And they are not prohibitively costly, or subject to continuous replacement.

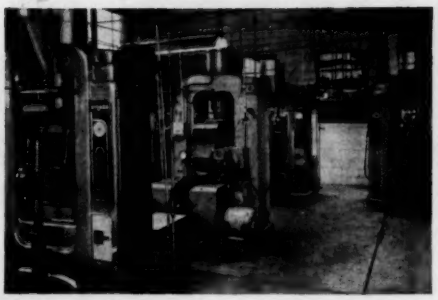
Fabricators with experience in handling other plastic sheets, rods and tubes find the same techniques work with Lucoflex. It can be formed, welded, machined, drilled and sawed. In addition, it comes in the form of molding compound that can be extruded and transfer molded.

American Lucoflex has prepared a booklet about this unusual rigid vinyl that should interest plastics fabricators and chemical processors alike. A copy will be sent you on request. American Lucoflex, Inc., 1 East 57th Street, New York 22, N. Y.



FABRICATED LUCOFLEX tank insert lines a steel tank. Used for plating operations which employ corrosive acids and chemicals. Round, square and odd shape Lucoflex tank inserts can be easily fabricated for other applications.

Lucoflex



Automatic Molding cuts costs for Electric Steam Radiator

These fully automatic molding presses have operated 24 hours a day ever since they were installed. The only work required is filling hoppers and removing finished parts.

New production figures of the Electresteem vaporizer and the Baby Chef Jr. bottle warmer are gratifying to both executive and shop levels of Electric Steam Radiator Corporation, Paris, Ky.

In the re-designed form—plastics replacing porcelain—the product is generally superior: more durable, lighter, easier to handle, and with less external heat loss.

If you want to know what automatic molding can save you in production costs, send parts or blueprints for a free analysis and report by Stokes engineers.

STOKES MAKES Automatic and Semi-Automatic Molding Presses, Plunger Presses, Closure Presses, Preforming Presses, Industrial Tabletting and Powder Metal Presses, Vacuum and Special Processing Equipment, Water Stills and Special Machinery.

STOKES

F. J. STOKES MACHINE COMPANY, 5004 TABOR ROAD, PHILADELPHIA 20, PA.

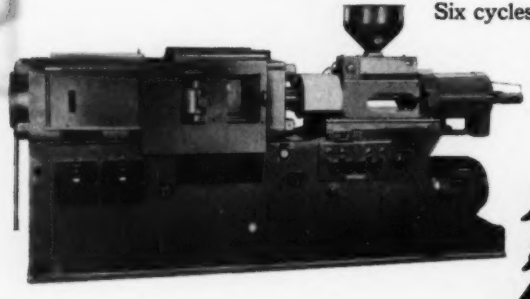
full benefit of new the ~~old~~ ONE-TWO!

Sharp, fast set-up...then the close-in power punch...

that's the essence of Fellows speed-cycle improvement.

The Fellows two-speed injection plunger...rapid advance,

then peak power...is ideal with pin-point gating.



Six cycles per min. (dry-run) on the 5C-8!

Better look at Fellows first.

Fellows
LEOMINSTER

injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Div., Head Office & Export Dept., Springfield, Vt. Branch Offices: 323 Fisher Bldg., Detroit 2. 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1 • New England Distributor: Leominster Tool Co., Leominster, Mass.

A PLASTIC CO. INCREASES PRODUCTION 25% WITH

STERLING SLO-SPEED!

Replacement of line shafting and one motor with individual, compact, self-contained Sterling Slo-Speed Geared Electric Power Drives on three tumbling barrels increased production 25%, reduced power costs about 25%, decreased maintenance costs 20% and improved employee morale through greater plant safety, reports Allen C. Pearson, General Manager of Ace Plastic Co., Jamaica, N. Y.

STERLING SLO-SPEED GIVES YOU THE ONE BEST LOW SPEED AND

gives uninterrupted service—carries heavy overhung loads—provides versatile mounting and flexibility in arrangement of machinery—saves valuable space—provides greater safety—costs less to install and use. An indispensable source of low speed power for:

Agitators	**Dryers**	**Presses**
Blenders	**Feeders**	**Pumps**
Blowers	**Kilns**	**Screens**
Conveyors	**Mills**	**Tumblers**
Cookers	**Mixers**	**Etc., etc.**

OTHER STERLING ELECTRIC POWER DRIVES:

- **STERLING SPEED-TROL (VARIABLE SPEED) MOTORS**
- **STERLING KLOSD AND KLOSD-TITE (NORMAL SPEED) MOTORS**

DRIP-PROOF • SPLASH-PROOF • TOTALLY ENCLOSED

70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. **C-114**

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile

Offices and distributors in all principal cities.

Plastics for Industry

Improve the appearance of your product with a decorative plastic nameplate utilizing CRUVER'S years of experience in this field.

Our "Bas Releef" process will bring out all the beauty and color of your trademark or design.

Write today for representative samples and information on plastic nameplates.

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PIONEERS IN PLASTICS SINCE 1896

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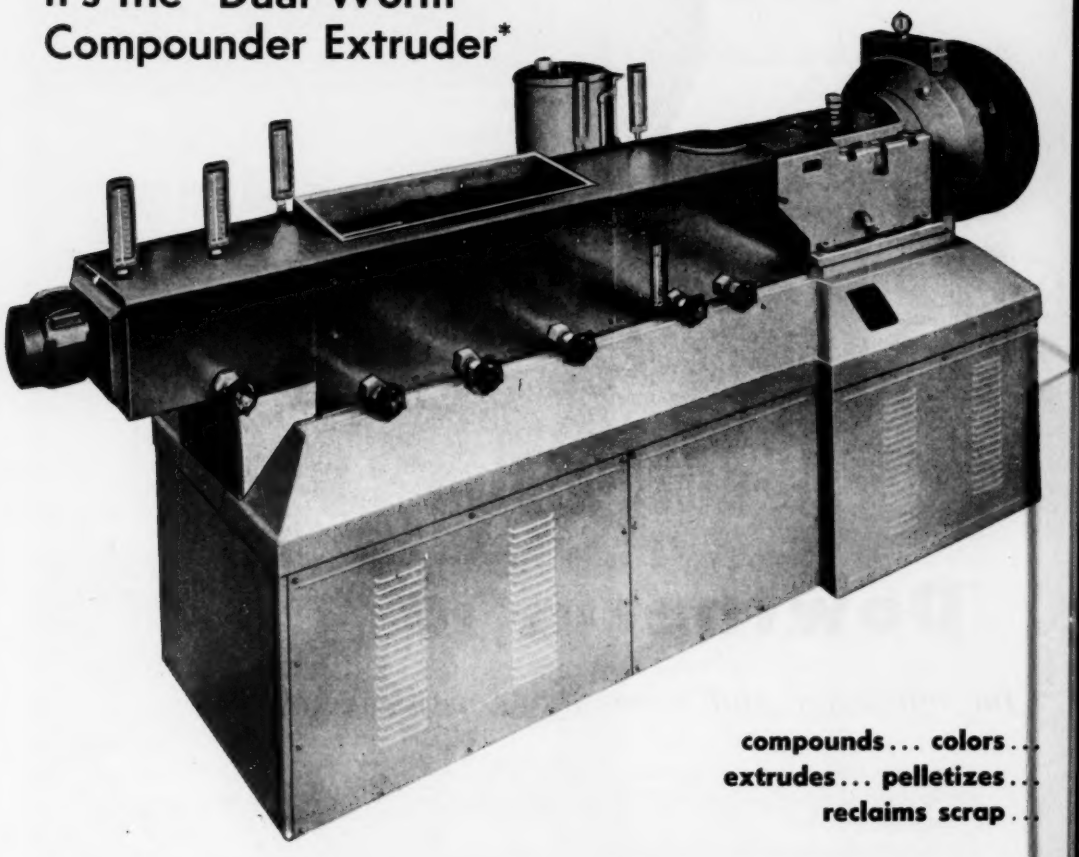
Branch Offices: DAYTON • DETROIT • MINNEAPOLIS • NEW YORK • PHILADELPHIA • SYRACUSE

DO 5 JOBS ON THIS 1 MACHINE!

It's the "Dual Worm" Compounder Extruder*



compounds... colors...
extrudes... pelletizes...
reclaims scrap...

HERE is an extruding machine to slash your production costs by doing the work of five separate kinds of equipment.

The patented interacting "Dual Worms" that operate in a "pressurized" cylinder provide the explanation. They generate so much power, work so fast and knead so thoroughly that they're able to perform functions beyond the capacity of most conventional extruders.

Operation of the machine is simple and almost entirely automatic except for feeding raw materials or scrap into the hopper.

The "Dual Worm" Compounder Extruder is available with 2" worms—output approximately 100 pounds per hour. Larger, higher capacity units are in prospect.

Write today for prices and free descriptive brochure.

SMART & BROWN (Machine Tools) LTD.

24, 25, Manchester Square, London W. 1, England

Telephone: Welbeck 7941 Cables: Smartool, Wesdo, London

* By agreement with Messrs. WELDING ENGINEERS, Norristown, Pennsylvania, U.S.A., Smart & Brown (Machine Tools) Ltd. are the licensed manufacturers in England of 2" "Dual Worm" Compounder Extruders. They are also the sole distributors for all countries except North America. Local agents are being appointed.

for molding
or
calendering

Dowtherm

for efficiency and economy in process heating

DOWTHERM,* the heat transfer medium for high temperatures, has economically increased efficiency and improved quality in many cases.

DOWTHERM has made definite contributions to the plastics industry. Its ease of control and application assists in the mass production of nylon and phenolic and alkyd resins.

DOWTHERM speeds the heating cycle and reduces labor costs. An outstanding characteristic is the accurate control it affords in obtaining temperatures between 300 and 750°F. at low pressures.

Are *you* fully acquainted with DOWTHERM's higher operating efficiency? For more information write Dept. DO-5B.

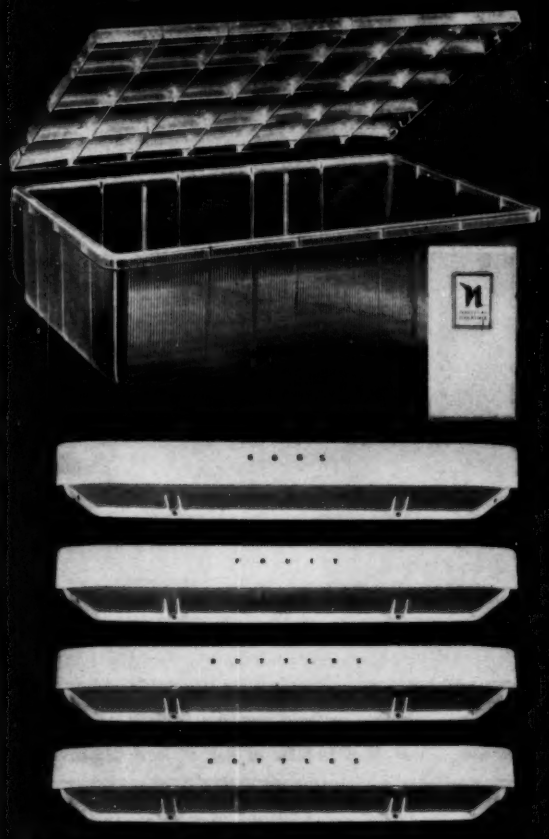
THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

SPEEDS HEATING • IMPROVES PRODUCTION

DOWTHERM

Inside and Outside

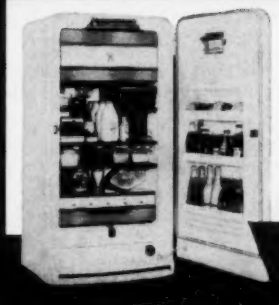
Norge Uses Custom ion Molded Plastics by ERIE RESISTOR



For efficient storage and sparkling identification . . . Erie Resistor gives Norge a single source for all its custom molded plastic requirements. It is a single source with multiple facilities . . . a battery of 23 presses that range from 2 to 60 ounces.

The pieces for the Norge Refrigerator reflect that versatility. The ample Quick Chill Tray measures 21" by 14¾" by 6½", and lid and tray are ribbed for reinforcement. Each of the four Handidor shelves is a complete unit in one piece, and measures 19¾" long by 2¾" deep. The handsome three dimensional plastic panel in the door release weighs only 2¾ ounces.

Erie Resistor combines complete and up-to-the-minute equipment with experienced and up-to-the-minute know-how. Whether the important thing is dimensional accuracy, crystal clear flawless transparency, freedom from warpage, or startling beauty in three dimensional nameplates . . . it pays to consult Erie Resistor.



Seven separate plastic parts, molded by ERIE RESISTOR, go into every popular Norge DSD 86 Refrigerator: the big Quick Chill Tray and lid; four trim Handidor shelves; and the eye-catching panel for the door release, in metallic blue on white.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND . . . TORONTO, CANADA

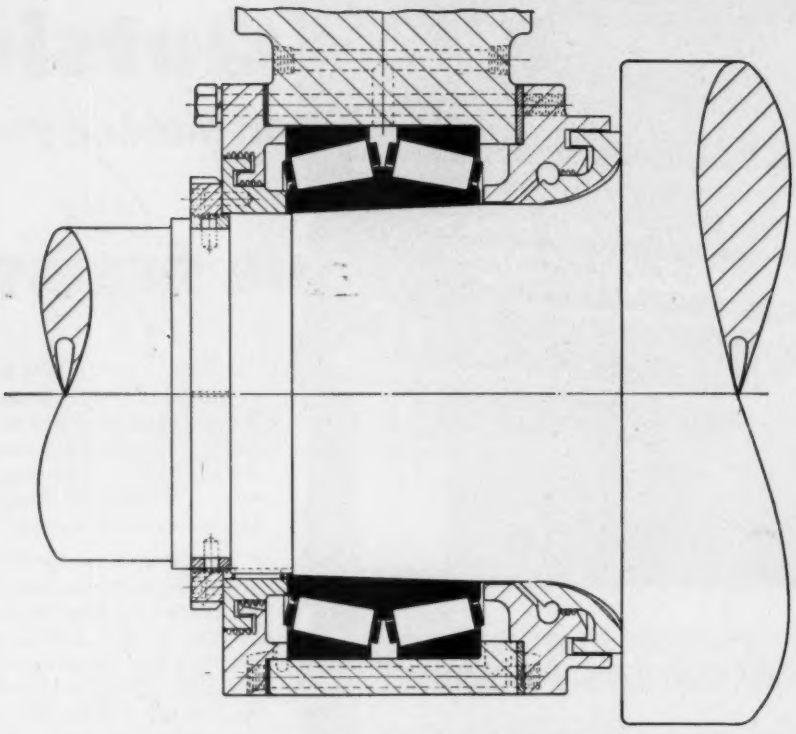


Diagram shows typical application of Timken bearings on calender rolls.

UNIFORM GAGE STARTS HERE!

BY mounting calender rolls on Timken® tapered roller bearings, you take a long step toward maintaining uniform thickness of rubber sheeting and plastic film.

Timken bearings may be properly adjusted to assure free rotation, without looseness, when the calender rolls come up to operating temperature—maintaining accurate control of gage. Since rolls are held in positive alignment, vertical roll movement is minimized.

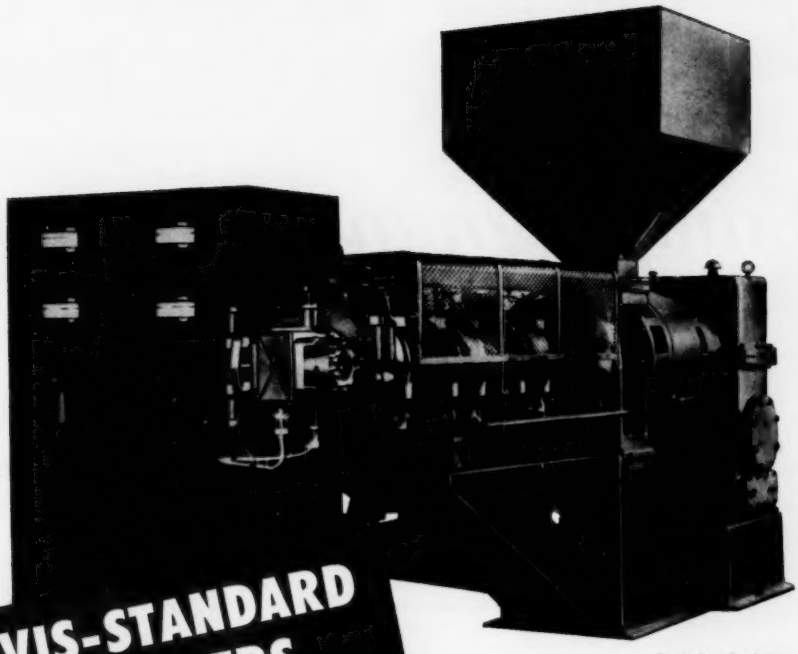
Due to tapered construction, Timken bearings take any combination of radial and thrust loads. True rolling motion and incredibly smooth surface finish make friction negligible. Roll neck wear is eliminated. Maintenance costs are cut.

No other bearing can give you all the advantages you get with Timken bearings on calenders, mills, refiners, and mixers. For full information, write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ↔ LOADS OR ANY COMBINATION



Davis-Standard 6"
Thermoplastic Extruder

DAVIS-STANDARD EXTRUDERS

...ENGINEERED TO YOUR OPERATING NEEDS

Every feature of our extruders for rubber or plastics is the result of long experience in the extrusion industries and intimate knowledge of production problems.

Davis-Standard "Stream-Flo" insulating heads permit the most efficient operating velocities. All head equipment is compact, accessible and easy to clean. For thermoplastic applications, sectional-type cast steel cylinders afford precise temperature control as well as maintenance advantages. Each section has wear and corrosion-resistant liners.

Another exclusive feature of Davis-Standard plastic extruders is the "Therma-Fin"* heating jacket, with range-type tubular heating elements and stainless steel cooling coils cast into aluminum cooling fins.

*Patent Pending

With this construction any desired temperature condition may be obtained.

Feed section is a separate casting. Stock screws are of special steel alloy, normally bored for water cooling. Variations for depth and lead are available for different compounds. Drive is V-belt or flexible coupling to enclosed worm reduction gear. Davis-Standard machines are furnished complete, including control panel, ready for installation.

Our engineers will welcome the opportunity to work with your engineers on your problems. Our extensive experience in custom-built equipment will fit the installation to your exact requirements.

EST. 1848

THE STANDARD MACHINERY COMPANY

MOLDING PRESSES AND EXTRUSION MACHINES
WORLD'S LARGEST MANUFACTURERS OF CUSTOM-BUILT EXTRUSION MACHINES
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Export Office: Ballagh & Thrall, Independence Square, Philadelphia 6, Pa.

Striking Campaign in

The Saturday Evening

POST

continued for 1952 . . . users of Phillips Cross-Recessed-Head Screws reap the benefit

Once again readers of The SATURDAY EVENING POST are being told to look for the clue to quality: Phillips Cross-Recessed-Head Screws. Take advantage of this powerful promotion by assembling your products with these quickly identified fasteners. You save time, work, money because Phillips Screws . . . Wood, Machine, Tapping or "Sems" . . . start faster, eliminate driver skids, damaged parts, split screw heads. What's more, they add structural strength. Be sure to include the clue to quality in your specifications!

X marks the spot . . . the mark of extra quality

PHILLIPS *Cross-Recessed-Head* SCREWS

manufactured by

AMERICAN SCREW CO. • ATLANTIC SCREW WORKS, INC.
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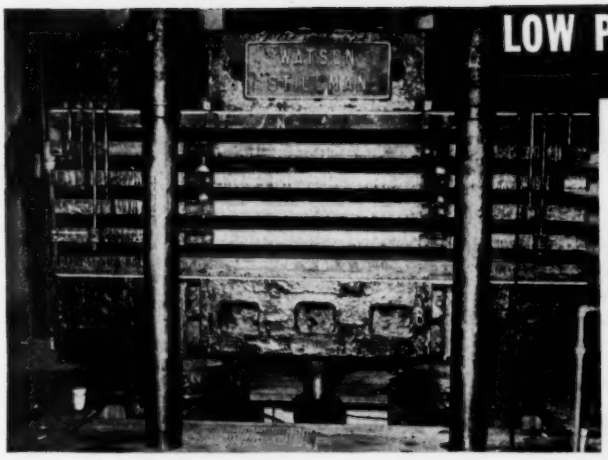
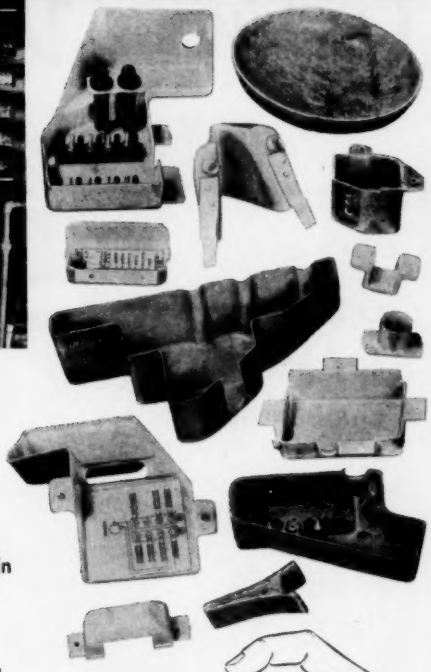
THE FASTENERS OF TODAY . . . AND OF THE FUTURE



LOW PRESSURE LAMINATES



THE LARGEST OPERATION IN AMERICA

As far as we know, there is no larger operation *anywhere* in our particular field of Fiberglas-reinforced laminates. For example, our 700 ton press produces panels in any size up to 4x9 feet . . . as many as 15 sheets at a time . . . in any thickness up to ½" . . . in an unlimited range of colors. **Repco Panels** have a multiplicity of applications for aircraft backing board and for functional and decorative purposes. May we send you samples and suggest how they may be used in your industry?

We're largest as well in matched die molding due to our scores of presses that are producing parts where neither size nor complexity of contour is a limiting factor. **Repco Plastics** are as dimensionally stable as metals, of light weight, high strength, low moisture absorption and high temperature resistance.

If you have a problem, our unusually large staff of engineers and chemists would welcome the opportunity of suggesting a solution. Complicated projects, especially those where other materials or methods have failed, present a challenge we enjoy.

MATCHED DIE MOLDING
Parts as small as ¼" x 1½"

STRUX EXPANDED PLASTICS

Manufactured under license from E. I. duPont de Nemours & Co.

CELLULAR CELLULOSE ACETATE (CCA)

A light weight, sealed cell material extruded continuously in rods, boards or special shapes. Excellent as a core for sandwich construction.

Especially adaptable to the aviation, marine, housing and display industries.

Write for sample.

Repco Plastics by *Russell* REINFORCED PLASTICS CORP.

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Affiliated Companies	STRUX CORPORATION	*Lindenhurst, N. Y.*
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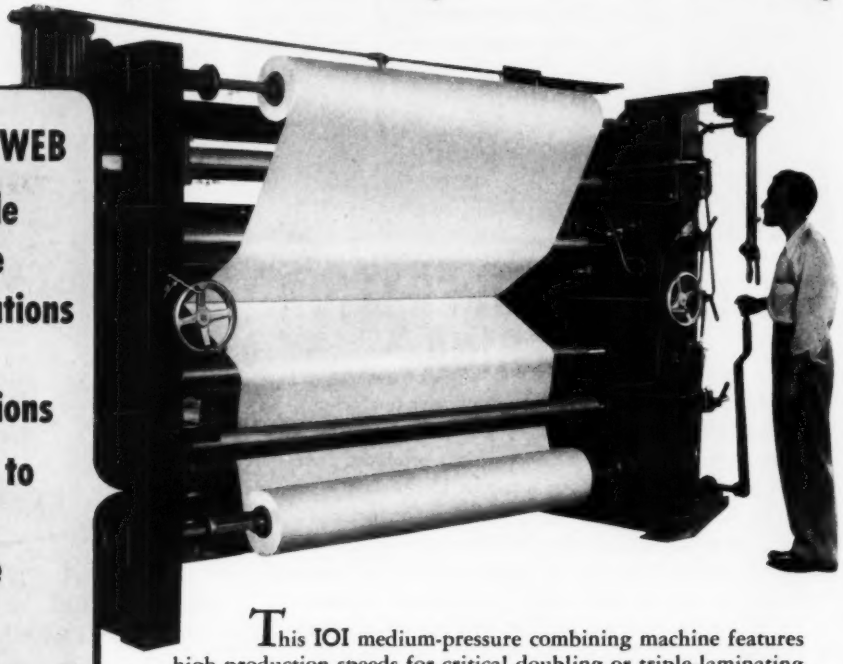
West Coast Representative	ALLIED PRODUCTS ENGINEERING CO.	*Los Angeles 43, California*

Designed and Built by IOI to improve your

Combining... Doubling... Laminating



WEB to WEB

In Double or Triple Combinations or Laminations

At Light to Heavy Pressure

At true Constant Tension and Variable Speeds

This IOI medium-pressure combining machine features high production speeds for critical doubling or triple-laminating operations. It is available in a variety of face widths, ranging from 36 to 96 inches. The machine pictured has a 90 inch face width.

Sandwich thickness is accurately controlled by micrometer roll spacers. All unwinding and windup heads are driven at true constant tension by a sensitive, variable-volume, variable-pressure fluid drive. Threading speeds down to 12 inches per minute are provided, as well as a reverse drive for easy stock handling and triple combining.

Lateral register is built into each unwinding head. Adjustable edge slitters are also incorporated. The unit will handle previously coated webs of pressure-sensitive materials. It can be used in conjunction with IOI fusing equipment for thermo-setting vinyl-based and other types of adhesives.

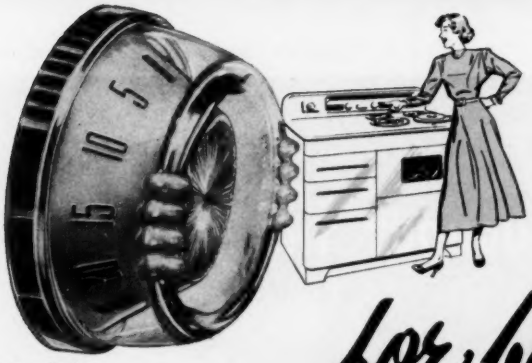
Variations of this machine's basic design are available for any roll face, operating speed or combining pressure.

An **IOI** engineer will be glad to show you how this machine can be applied to your particular processing requirements. Write on your business letterhead for further information.

INDUSTRIAL IOI OVENS, INC.

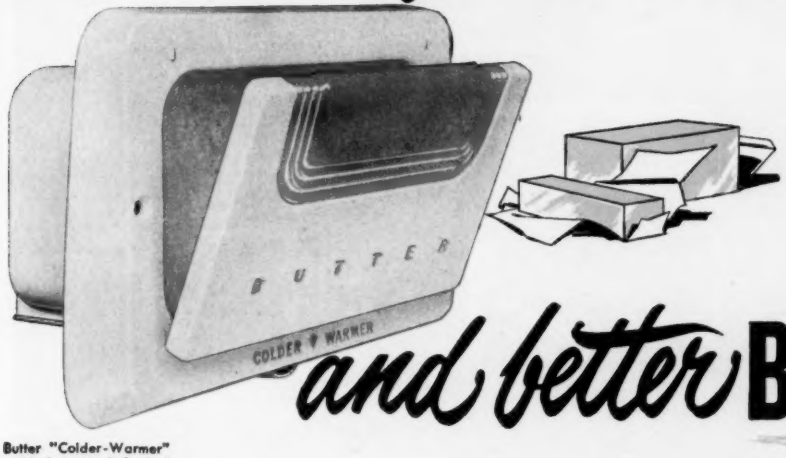
ENGINEERING VERSATILITY

13825 TRISKETT ROAD CLEVELAND 11, OHIO



Control Knob molded in two pieces, finished in four colors and assembled by AMOS.

for better BREAD



Butter "Colder-Warmer" molded, painted, finished and assembled by AMOS.

and better BUTTER

contact Amos MOLDED PLASTICS...

A Cordial Welcome
Awaits YOU At
AMOS BOOTH 215B

5th NATIONAL PLASTICS EXPOSITION
PHILADELPHIA
MARCH 11-14
SPE 1952

Phone, wire or write:

No . . . AMOS isn't in the *bakery* or *dairy* business . . .

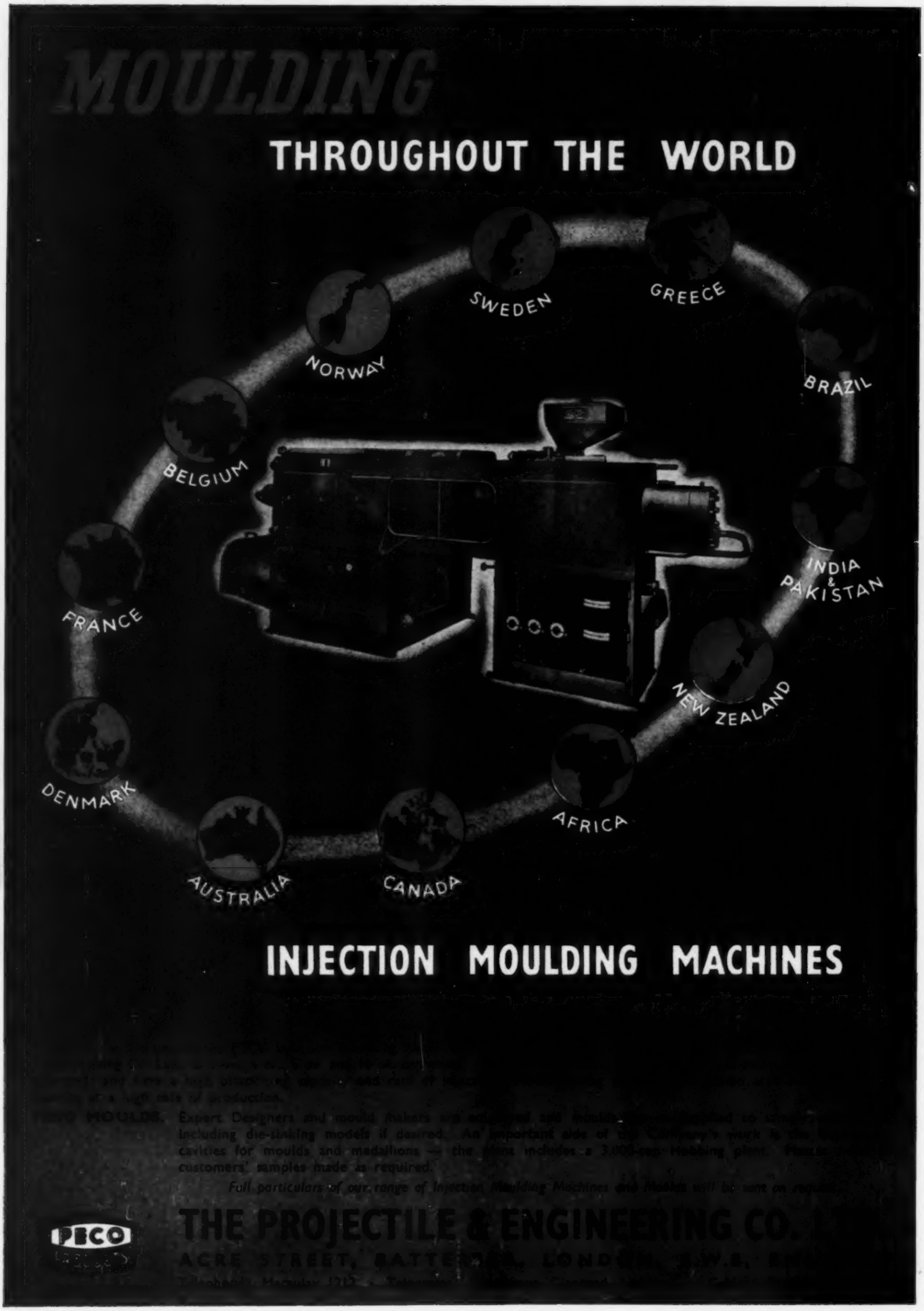
AMOS *is headquarters* for the *finest* in custom injection molding . . . with the world's largest equipment . . . complete facilities to DESIGN, ENGINEER, TOOL, MOLD and FINISH all under one roof . . . plus the *ingenuity* and *experience* to produce *new* applications.

That's our "bread and butter" . . . just as *your product* is your "bread and butter"—*nothing is more important to you!*

So why not give your product the *benefit* of AMOS know-how and finer facilities, including *complete finishing*—Plating, Printing, Painting, Hot Stamping and Silk Screening on plastics—with modern overhead and production belt conveyor system for assembly operations.

AMOS MOLDED PLASTICS • EDINBURG, INDIANA

OFFICES: NEW YORK, CHICAGO, DETROIT, PHILADELPHIA


MOULDING
THROUGHOUT THE WORLD
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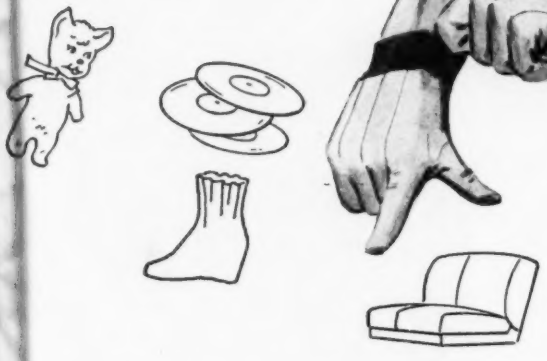
INJECTION MOULDING MACHINES
PECO
THE PROJECTILE & ENGINEERING CO.

They last twice as long... vinyl products stabilized with "Dutch Boy" DYPHOS



Two thousand hours *plus* in the Weatherometer without failure... that's the record of "Dutch Boy" Dyphos stabilized vinyl compounds.

In plastisols, as well as organosols and emulsion dispersions, Dyphos gives you opaque vinyl products—unequalled in light- and heat-stability—excellent in color retention and long-lasting flexibility.

Dyphos gives you these advantages in vinyl moldings and extrusions, too.

Recommended also for systems using chloro-paraffins as secondary plasticizers, Dyphos is a general purpose stabilizer. You can rely on Dyphos to give your vinyl compounds the qualities needed for standout performance in service.

Let us show you how "Dutch Boy" Dyphos can simplify your operations... double the life of your vinyl formulations. Also investigate the other "Dutch Boy" chemicals. Just write for factual data and technical assistance.

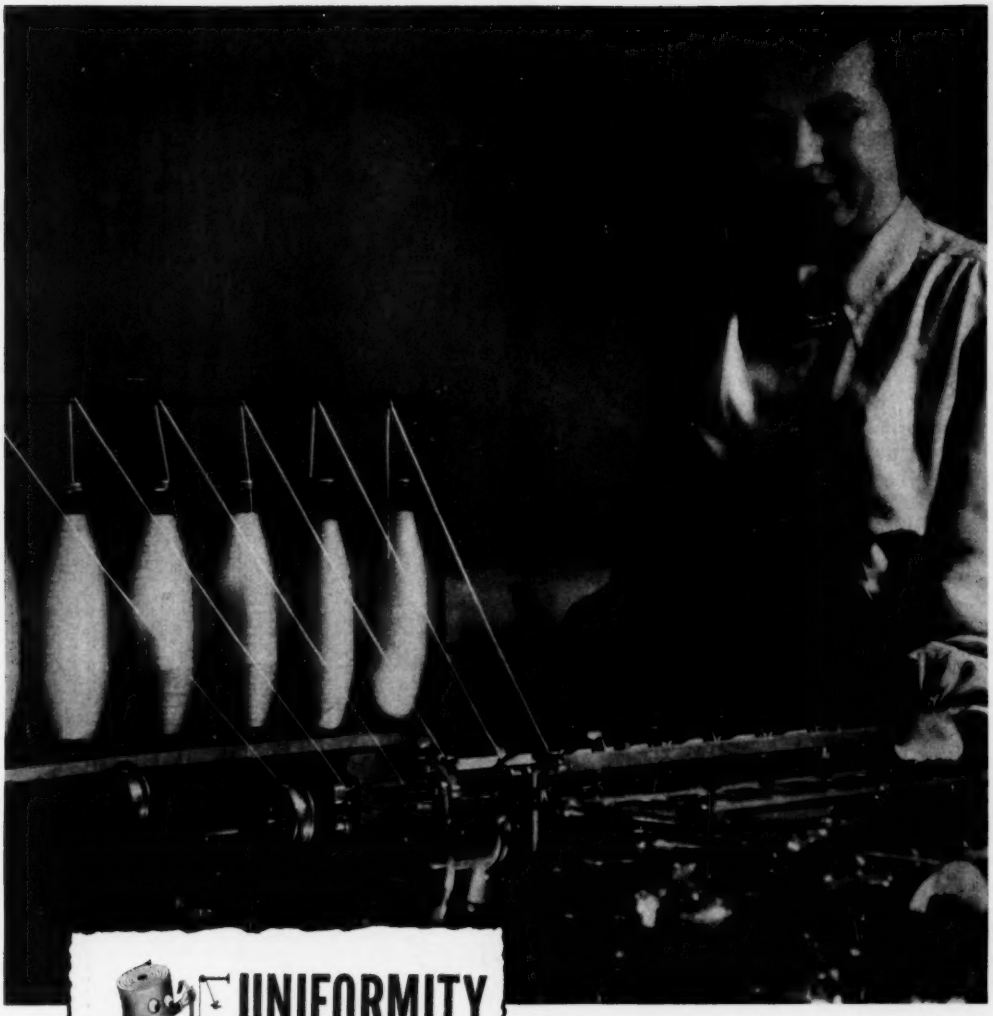
"Dutch Boy" Stabilizers

PRODUCT	USE
TRIBASE (Tribasic Lead Sulphate)	Electrical and other compounds requiring high heat-stability
TRIBASE E (Basic Lead Silicate Sulphate Complex)	Low volume cost insulation
DS-207 (Dibasic Lead Stearate)	Stabilizer-lubricant for sheeting, film, extrusion and molded compounds
PLUMB-O-SIL A (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored sheeting and upholstery stocks
PLUMB-O-SIL B (Co-precipitate of Lead Orthosilicate and Silica Gel)	Translucent and colored film, sheeting, belting
PLUMB-O-SIL C (Co-precipitate of Lead Orthosilicate and Silica Gel)	Highly translucent film and sheeting
DYTHAL (Di-basic Lead Phthalate)	General purpose stabilizer for heat and light. Good electrical properties
DYPHOS (Di-basic Lead Phosphite)	Outstanding for heat and light in all opaque stocks, including plastisols and organosols
NORMASAL (Normal Lead Salicylate)	As stabilizer or co-stabilizer in vinyl flooring and other compounds requiring good light-stability
BARINAC (Barium Ricinoleate)	Stabilizer-lubricant for clears

Dutch Boy* CHEMICALS

*Reg. U. S. Pat. Off.

NATIONAL LEAD COMPANY
111 Broadway, New York 6, N. Y.



UNIFORMITY
Makes the Big Difference
In LAMINATION Fabrics

MT. VERNON EXTRA Gives You Greater Fabric Uniformity

Shown above is one of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. The unit shown automatically tests 6 strands of yarn at one time.

Mt. Vernon-Woodberry Mills

Branch Offices: Chicago • Atlanta • Baltimore • Boston • Los Angeles

TURNER HALSEY COMPANY
Converting Yarn Agents
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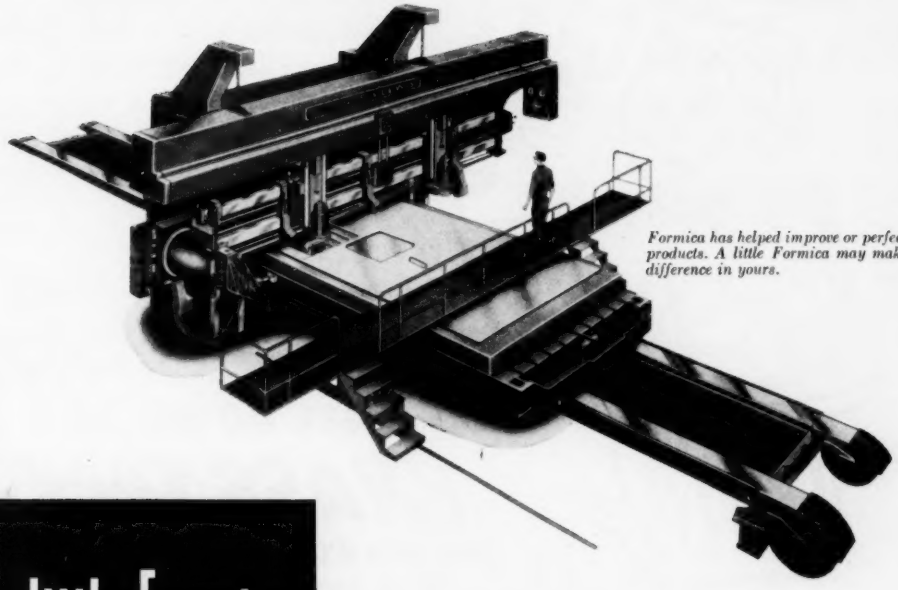


Formica has helped improve or perfect many products. A little Formica may make a big difference in yours.

a little Formica *makes a big difference*

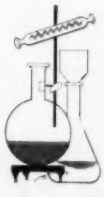
The Formica in Giddings & Lewis' 400,000-pound aircraft skin miller could be packed in your steamer trunk with room left over for a spare suit.

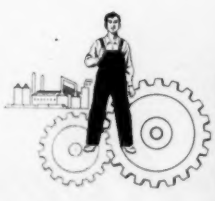
But size and weight are no gauge of Formica's contribution to the long life and operating efficiency of this industrial giant. Mated with metal for bearing ways that support 150 tons, Formica absorbs chips to eliminate scoring . . . reduces friction and costly wear . . . insulates against heat and distortion that play havoc with accuracy.

Formica's 50 standard and special grades of laminated plastics—in sheets, tubes, rods and postformed and molded parts—are marking up similar successes in electrical, chemical and mechanical applications everywhere.

Why not discuss your laminated plastics problem with the Formica representative located near you. He'll give you the benefit of Formica's varied experience without obligation.

THE FORMICA COMPANY, 4531 SPRING GROVE AVE., CINCINNATI 32, OHIO





HEADQUARTERS FOR LAMINATED PLASTICS SINCE 1913

Productive

FORMICA

Reg. U. S. Pat. Off.

at Work in Industry

there's no substitute for Formica
for electrical, chemical and mechanical applications

When you need dependable electrical insulation, unusual chemical resisting properties or high mechanical strength, there's no substitute for Formica. Insist on one of Formica's 50 grades.

LET'S GET DOWN TO BRASS TACKS

WE WANT YOUR PLASTICS PROBLEMS

The next time you have a plastics problem, we'd like to solve it for you. We are certain that we have the facilities to design and produce your plastic part exactly to your specifications. Every step is under one control—under one roof. We do the complete job—from designing and making the mold to producing the part of exactly the right plastic compound. We have served many different customers in a variety of industry. From our wide range of experience and know-how we feel certain that **you** can benefit.

Send your plastics problem to Cubee.

QUINN-BERRY CORP.
2651 West 12th Street
ERIE, PENNSYLVANIA

Quinn-Berry Corp.

PLASTICS

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Phone—Townsend 8-2577

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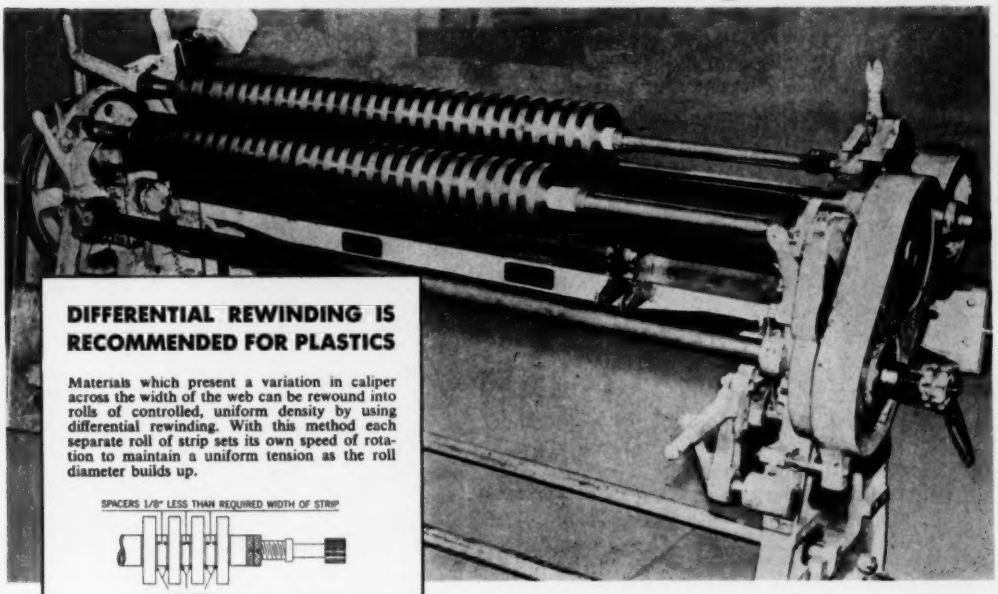
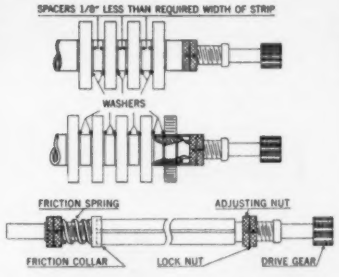
24 Decatur Road
Havertown, Penna.
Phone—Hilltop 7-0345

VERSATILE CAMACHINE SLITS PAPER, TEXTILES AND PLASTIC FILM



DIFFERENTIAL REWINDING IS RECOMMENDED FOR PLASTICS

Materials which present a variation in caliper across the width of the web can be rewound into rolls of controlled, uniform density by using differential rewinding. With this method each separate roll of strip sets its own speed of rotation to maintain a uniform tension as the roll diameter builds up.

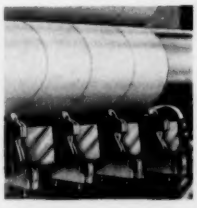


With differential rewinding the separate strips are rewound in alternate positions on two separate rewind shafts. Each strip is wound on a separate core, and the cores are separated by spacers and washers. The washers are keyed to a longitudinal groove in the gear-driven rewind shaft and rotate with the shaft. Axial spring pressure on cores, spacers and washers is sufficient to transmit the driving force from the shaft-keyed washers to the cores. This axial pressure is adjustable and not sufficient to lock the cores, each of which can slip independently as the diameter of its roll builds up. Thus, a roll which is winding at a point where the caliper of the web is greatest will build up its diameter more rapidly. The slight increase in tension due to the larger diameter will cause the core to slip, slowing its speed sufficiently to correct the tension.

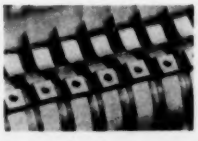
Efficient application of the principles of differential rewind depends on several factors, such as required tension, characteristics of the material, speed of rewinding, width of strips, etc. For best results, call on Camachine engineers.

AA-249

THIS MODIFIED CAMACHINE 26-3A features differential rewinding and combines score-cut and razor-blade slitting. Web speeds range up to 400 fpm. Exceptional trim width of 75" was specially provided for this user.



For paper, textiles and heavy gauge plastics the standard Camachine score-cut method of slitting is used. In this method the slitter units are spaced as required across the width of the machine. The web of material passes over a hardened steel platen roll and is separated by the pressure of the cutter wheels against the surface of the platen roll.



For light gauge plastics. The machine is equipped with an auxiliary razor blade slitting element. Razor blade slitting is used on plastic film ranging up to .010 acetate. Foot pedal control is provided at both the front and the rear of the machine.

CAMACHINE ENGINEERS will be happy to consult with you regarding faster production of top quality rolls of any material.

Cameron Machine Company • 61 Poplar Street • Brooklyn 2, N. Y.

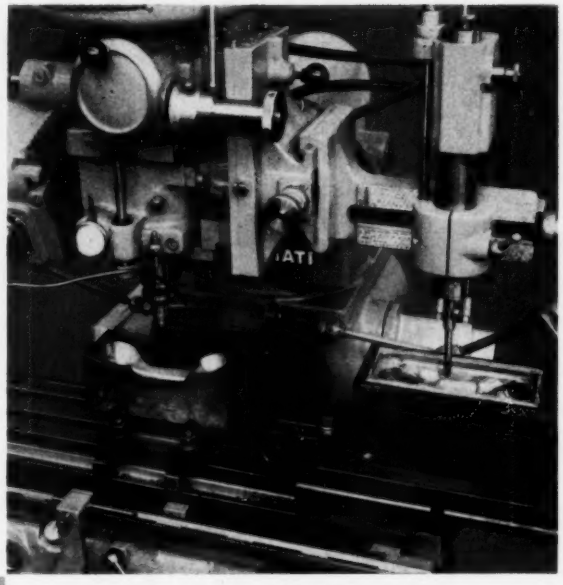
Consider the FACTS and you'll wind up with Camachines®

Supporting machine for operation die-sinking

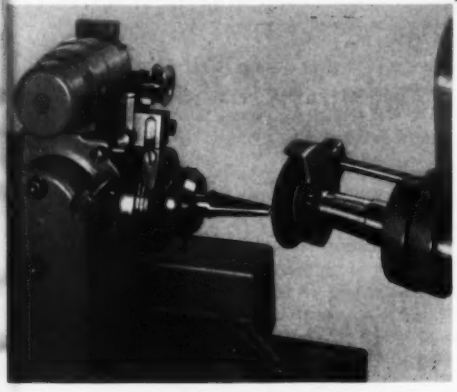
CINCINNATI MONOSET

Operation die-sinking might require a 7° draft angle cutter; or one having a ball nose; or one for milling a male or female radius; or one ground to a sharp point. All can be quickly and accurately ground—or made from solid bar stock by grinding—on CINCINNATI Monoset Cutter and Tool Grinders. They are the most versatile machines you can buy for work of this type and they're worth waiting for. A completely illustrated catalog tells the Monoset story. Write for publication No. M-1591-1.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



Milling the cavity in a mold for a telephone part. The machine is a CINCINNATI 8" x 18" Tool and Die Miller.



Die-sinking cutter and tracer finger—typical work assigned to a CINCINNATI Monoset Cutter and Tool Grinder.

CINCINNATI Monoset Cutter and Tool Grinder

Swing over main slide	12" dia.
Length, spindle nose to tail center, maximum	6"
Swivel range of workhead, horizontal plane	235°
vertical plane	40°
Indexing	8, 10, and 12 spaces

Complete specifications in catalog No. M-1591-1.

CINCINNATI

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

Ideal Plastics

world's largest custom injection molder

keeps you on schedule

More often than not, the timing of delivery of custom molded plastics causes the purchaser a lot of gray hairs. If, for any reason, his molder fails to deliver on time, the customer is likely to find himself in a costly mess.

Since speed . . . speed . . . and more speed is usually wanted, Ideal has keyed its organization to deliver it. With the unmatchable flexibility that one hundred injection presses (from three to three hundred ounces) permits, it's a rare occurrence when a schedule gets snagged for even a few hours because the right size and type molding machine isn't readily available.

Mold-building and finishing operations are other frequent stumbling blocks to on-time delivery . . . but *not* at Ideal. After more than 10 years in this business, Ideal knows the best way to have something done on time is to do it yourself. Ideal has two multi-million dollar toolrooms where our master toolmakers and apprentices can make any injection mold, regardless of complexity. Ideal's finishing facilities are, without fear of contradiction, the finest and most complete in the country.

Ideal's service consists of much more than fast delivery of precision-made moldings. You can count on the easy-on-the-budget pricing that Ideal is so widely known for, and on helpful suggestions on your product's design and merchandising.

Regardless of your need for extra-fast service, contact Ideal Plastics about your next molding assignment. Get acquainted with this friendly, cooperative custom injection molding organization—the largest one there is. Write to A. C. Manovill, Vice President in Charge of Sales, Ideal Plastics Corporation, 184-10 Jamaica Ave., Hollis 7, N. Y. Phone: AXtel 7-7000. Mid-West Representative, Steel Mill Products Co., 176 West Adams St., Chicago 3, Ill. Phone CEntral 6-5136.

Ideal carefully coordinates delivery of large injection molded parts for refrigerators, typewriters, furniture, air conditioning and other industrial and consumer applications with your production schedules.

Better Molded Plastics **Ideal** *for Industry & Home*

MOSLO *Minijectors*

MOSLO UNIVERSAL MINIJECTOR

MOSLO DUPLIMATIC MINIJECTOR

High Speed PRODUCTION *Low Cost* OPERATION

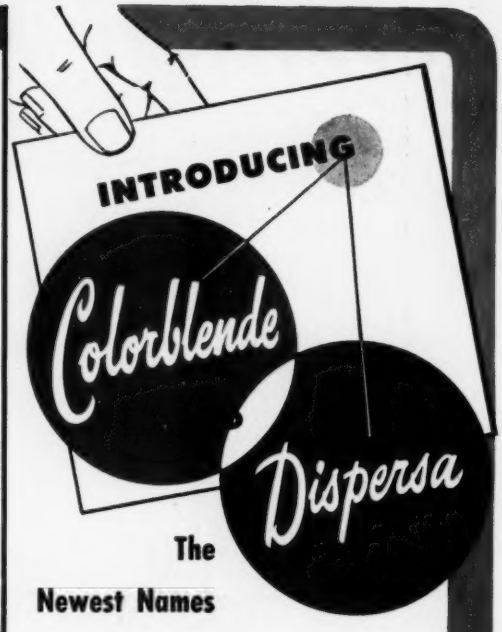
Want *volume* injection molding with low die expense? Then investigate these small high-speed Moslo Minijectors—which in hundreds of cases are out-performing larger machines in turning out small molded pieces or parts. Every Minijector is built for lasting service and will provide economical, efficient, automatic operation.

MOSLO DUPLIMATIC MINIJECTOR—especially for insert molding of cord-plugs, switch parts, etc. A two-sided self-positioning lower mold section allows operator to remove finished molded part from the mold section and refill with new inserts while the other mold section is in cycle. Automatic hydraulic operation provides for complete operator safety. Mold casting area 40 square inches. Injection pressure 20,000 p.s.i. Injection capacity to 4 oz.

MOSLO UNIVERSAL MINIJECTOR—A versatile, high-speed molding machine of up to 4 oz. capacity. Universal mold-clamp assembly readily accessible to operator allows mold to be changed in minimum time. Fully automatic hydraulic operation. Injection pressure 16,250 to 20,000 lbs. p.s.i. Casting area 30 to 60 square inches.

It will pay you to write today for complete information.

TERRITORIES OPEN FOR DISTRIBUTORS



The Newest Names In

Dry Colorants

Mid-America Plastics, Inc., is operating its Dry Color Division under full production. A completely equipped laboratory and modern manufacturing facilities formulate and compound "Colorblende" the dry colorant, and "Dispersa" the wetting agent. You can get immediate delivery of "Colorblende" in 17 Bureau of Standards colors or specify any special colors.

We invite your inquiry—write today for our price list and Color Comparison Chart. Upon request we will send without charge a sample of any standard color of your choice. "Colorblende" and "Dispersa" are packaged in convenient containers — in 50# or 100# units ready to color your crystal styrene in any mixing drum.

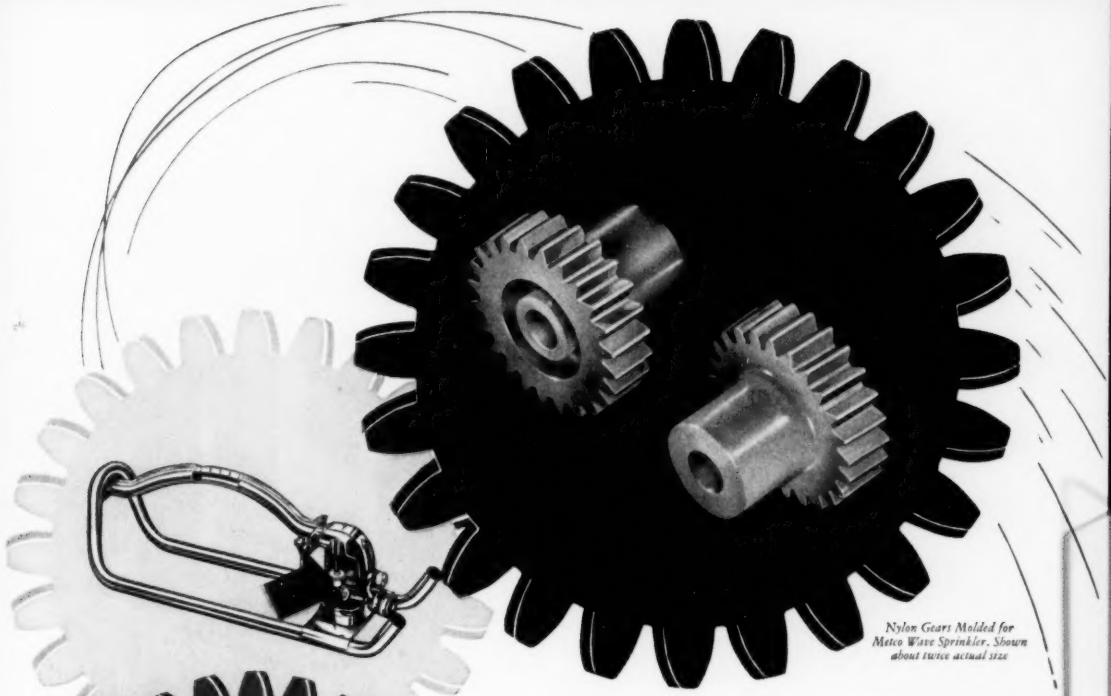
Quick — Easy — Dust Free — Economical

TERRITORIES OPEN FOR DISTRIBUTORS

MOSLO ENTERPRISES

MOSLO MACHINERY COMPANY
2443 PROSPECT AVENUE • CLEVELAND 15, OHIO

MID-AMERICA PLASTICS, INC.
COLOR DIVISION
2443 PROSPECT AVE. • CLEVELAND 15, OHIO



Nylon Gears Molded for Metco Wave Sprinkler. Shown about twice actual size

Skillful Molding

DOES A WELL GEARED JOB

". . . For long life with low wear, a non-metallic gear was a design requirement for the Metco Wave Sprinkler. We chose molded gears for economy and because of the wide range of materials which can be molded. We chose nylon as the molding material because of its high wet strength, low moisture absorption and abrasion resistance when operated with water as the only lubricant."

This excerpt from a letter by Mr. C. K. Wilson, Design Engineer for Metallizing Engineering Company, Long Island City, New York, effectively presents a strong case for molded gears.

If Mr. Wilson had continued in that vein, he might also have said, "We chose Elmer E. Mills Corporation because it is one of the few molders in the country equipped to mold nylon gears."

Why? Because this type of thermoplastic molding presents a challenge few molders care to meet. Since these were undercut "helical" gears instead of the straight "spur" gears, their production presented an unusually difficult job of molding and tool making. Despite the fact that only a few molders can make them, the use of thermoplastic gears is very much on the increase.

Wherever they are used, it is either a case of greater production economy, functional superiority, or both.

So when you are studying the problem of gears for your products, consider the advantages of nylon or other thermoplastic gears. Then let us show how well geared we are to solve this problem for you.

Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about [redacted]* *piping, tubing and fittings, write for circulars containing data and illustrations.*

**Trademark Registered*

ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Fibestos, Lucite, Nylon, Plexiglas, Polystyrene, Styron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, [redacted]*, Saran, and other Thermoplastic Materials.

2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS

MPc has the Capacity and the Skills to mold the Big ones

80 lbs. per cycle

Giant size plastic moldings call for giant press capacity . . . of course. But it takes more than a big squeeze to turn out huge castings in production quantities. Increased size poses new problems in mold design and construction. New techniques are needed to control the flow of the massive "charge" . . . for thorough curing and flawless surface finish. In pacing the advance to ever larger plastic castings, **MPc** has acquired a matchless fund of specialized experience. This priceless "know-how" is yours to use in the design and production of your large plastic parts.

Address MOLDED PRODUCTS CORPORATION, 4535 W. Harrison St., Chicago 24, Illinois

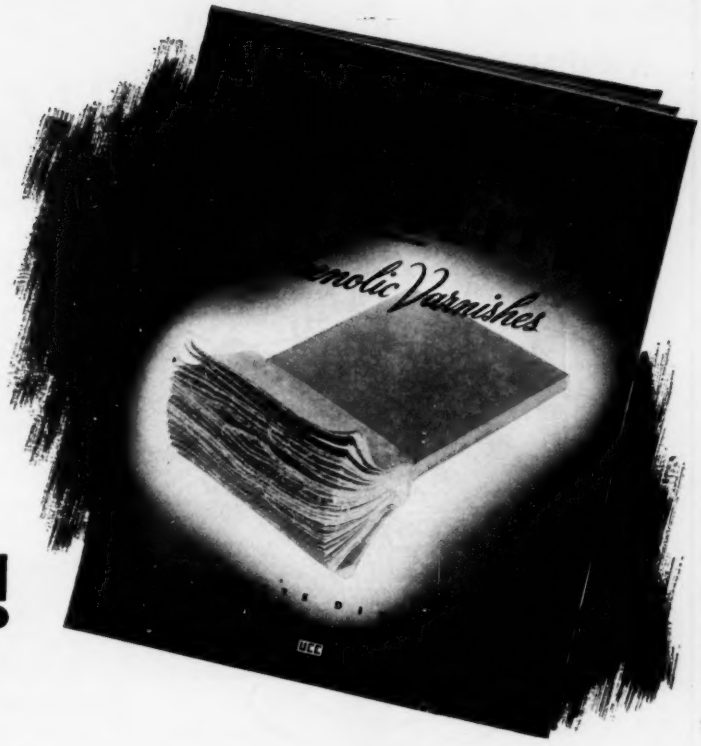
5th NATIONAL PLASTICS EXPOSITION
PHILADELPHIA
MARCH 11-14
SPE 1952

FREE "Data Book of MPc Facilities," an engineering-eye view of **MPc** press capacities and other production facilities . . . together with a survey of **MPc** special skills available for your use. *Write for your copy.*

PLASTICS DIVISION
MOLDED MPc PRODUCTS
CORPORATION

. . . Pace-Makers in Plastics Molding

SEND FOR IT TODAY!



...The WHAT-WHY-WHERE-WHEN and HOW of LAMINATED PLASTICS!

IF YOUR BUSINESS uses structural materials, decorative materials, or electrical insulating materials—you should know the fundamental facts about laminated plastics made with BAKELITE Phenolic laminating varnishes.

To supply these facts, Bakelite Company offers you this 36-page illustrated booklet telling what these materials are, how they are made, and how they can be used to improve the performance, beauty, economy, and sales value of your products.

Case histories of the various types and grades of laminated plastics available for many fields of application are included in the guide book, along with test data on their physical, chemical, and electrical properties, and the methods employed in their fabrication and finishing.

A list of representative manufacturers using BAKELITE Phenolic Resins for the production of outstanding laminated plastics for countless end uses is included. Fill out and mail the coupon for your free copy of this indispensable reference and data book today!

BAKELITE
TRADE-MARK
PHENOLIC LAMINATING PLASTICS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.

BAKELITE COMPANY, Dept. DJ-13
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

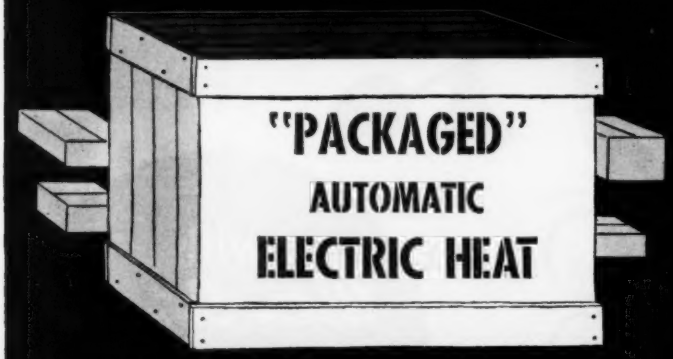
Please send me free copy of "Laminated Plastics Made with BAKELITE Phenolic Varnishes."

*Name*_____ *Title*_____

*Company*_____

*Street*_____

*City*_____ *State*_____



combining Heater and Thermostat in one unit

ready to go on your Jobs!

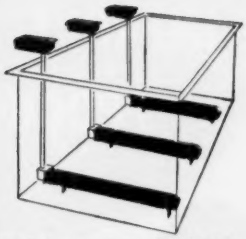
CHROMALOX 'Packaged' Electric Heaters are ideal as permanent or portable heat sources in tanks, drums, process kettles and other containers. With CHROMALOX Heaters you can heat accurately and maintain the temperature of degreasing, cleaning, pickling and plating baths. You can melt greases, asphalt and similar viscous fluids. CHROMALOX Units may be had in the types, sizes and wattages required to efficiently do your heating jobs. They are available with sheaths of copper, stainless steel, alloy and lead for resisting the corrosive actions of the solutions you are using.

Nation-wide engineering service for on-the-job assistance and recommendations. Write, wire or phone for the name of the Chromalox Engineering Representative serving you.

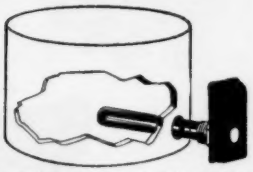
CHROMALOX

Electric Heat for Modern Industry

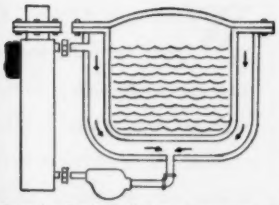
Variety and Versatility to fit your Needs Exactly



Chromalox Immersion Heaters with built-in thermostats for portable or permanent use. Drawing illustrates Immersion Units, equipped with sludge-legs, installed over the side of the tank for direct heating. Available in various metal sheaths to resist the corrosive action of the liquid compounds.



Compact, thermostatically controlled, screw-in type Chromalox Immersion Unit is easily installed in smaller tanks and other containers. Thermostat range is 100° to 180° F.



Chromalox Circulation Heaters give accurate, controlled heat up to 750° F. for heating Dowtherm, Aroclor or heat transfer oils. Other uses include water heating applications such as steam boilers and accumulators, kettles, tanks and processing equipment, preheating fuel oils, heating air, nitrogen and other gases; drying steam, plastic powders, etc.

Clip Coupon

For complete details showing how to use Chromalox Heaters in your applications.

Industrial Division IC-56
EDWIN L. WIEGAND COMPANY
7503 Thomas Boulevard, Pittsburgh 8, Pa.
Please send "100 Ways to Apply Electric Heat" booklet.

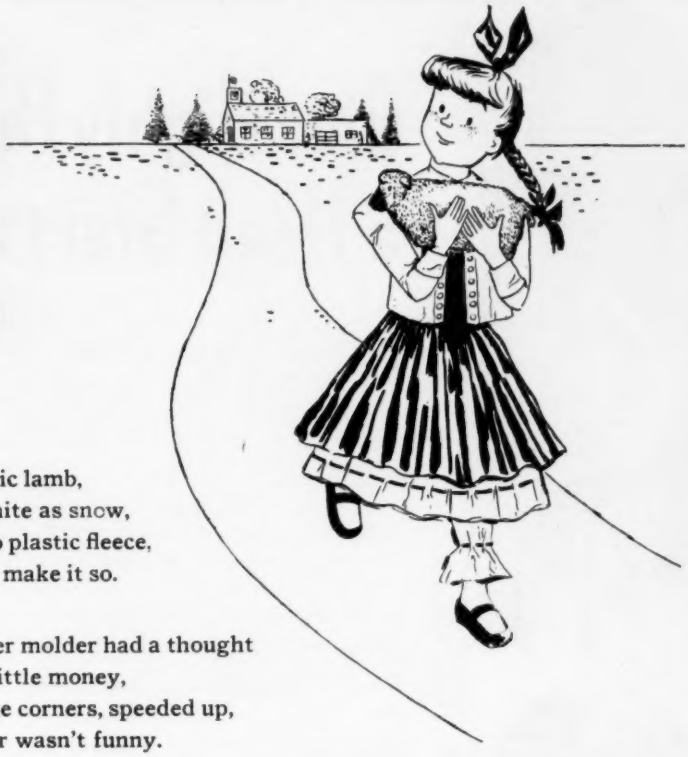
Name_____

Address_____

City_____ Zone_____

State_____

Mary had a plastic lamb



Mary had a plastic lamb,
Its fleece was white as snow,
And if there is no plastic fleece,
The rhyme must make it so.

But then her molder had a thought
To save a little money,
He cut some corners, speeded up,
The answer wasn't funny.

For Mary's mad, she's not so proud,
Her lamb is not as pretty,
In fact, so messy is the job
It looks more like her kitty.

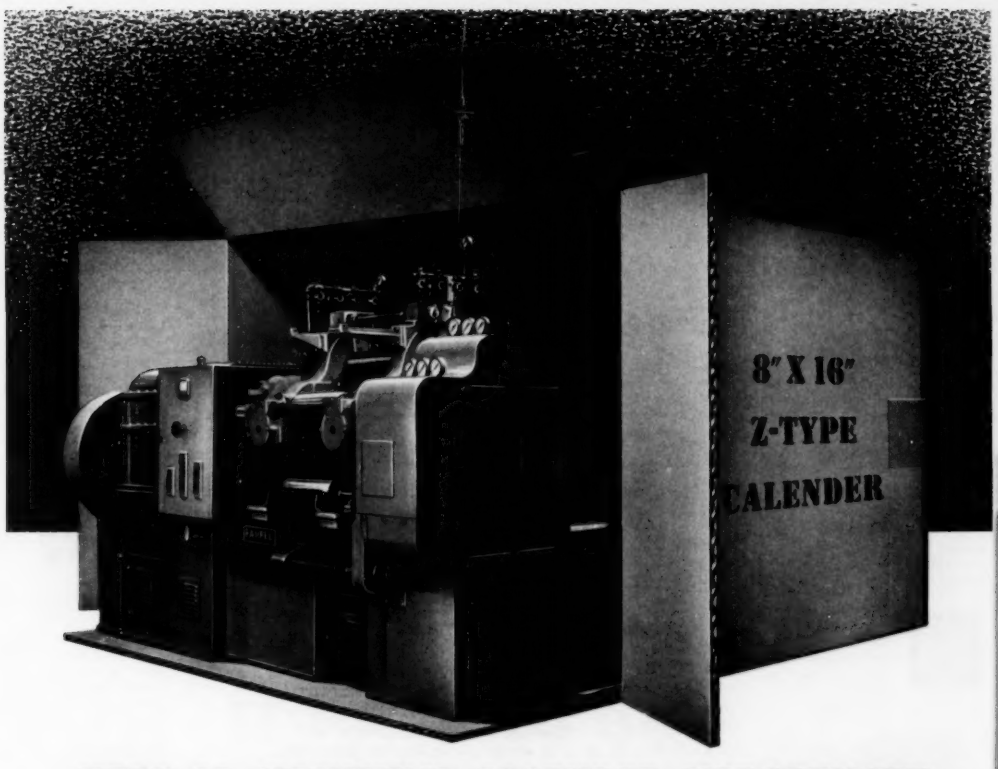
The moral's clear, since you must trust
The molder of your choosing
Be sure he's known for honesty
And has been around long enough to know what he's talking about both before and after he takes the order.

Like us . . .

BOONTON MOLDING CO.

BOONTON, NEW JERSEY

NEW YORK OFFICE — CHANIN BUILDING, 122 EAST 42ND STREET, MURRAY HILL 6-8540



HERE IS MAXIMUM CALENDER VERSATILITY IN A SINGLE PACKAGE

This 8" x 16" four-roll Z-type calender is probably the most highly versatile experimental machine of this type ever built. The drive arrangement permits flexibility in roll speeds and ratios for experimentation in single and double coating, sheeting, and running unsupported plastic film of very light gauges.

The drive motor furnishes adjustable speed for the four calender rolls, and a unique arrangement of gears and clutches provides variables in roll speeds one to another. This means that, by a simple movement of clutch levers, the rolls may be set at related speeds determined in advance to be most advantageous for the work to be done.

The rolls are bored and equipped with rotary joints for the circulation of temperature-controlling fluid. Gauge adjustment of all but the fixed lower roll is by hand ratchet. The use of clutches on the top roll and bottom side roll permits independent movement of roll ends or the simultaneous adjustment of both ends of either roll. In this manner roll openings can be set precisely for the most accurate production to gauge.

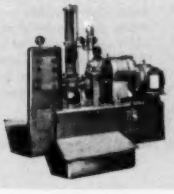
This unique calender is an example of the made-to-order laboratory equipment—calenders, Banburys, mills, extruders, refiners, etc.—which you can obtain from Farrel-Birmingham. Send for information on machines to meet your specific needs.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Farrel-Birmingham®

FB-730



This size 3 Banbury mixer, with a capacity of two pounds of crude natural rubber or gravity of batch times 2, can be conveniently and economically used in making trial batches. It is driven by a four-speed motor and is equipped with an exceptionally large air cylinder for forcing stock into the mixing chamber.

The two rolls of this 6" x 13" self-contained laboratory mill are individually driven, providing a considerable range of operating speeds and friction ratios. Speed range of the back roll is 3 to 48.9 RPM and the front roll from 4.6 to 36.8 RPM. The mill has tiltable guides, scrapers, knee-operated safety trip and cascade lubrication.

Tupper Seal, air and liquid tight flexible covers fit, and are included in the sets of all Tupperware Canisters.

The Tupperware 50 oz. Canister is "standard equipped" with the Tupper Seal, air and liquid-tight flexible Pour All cover.

The Tupper Seal, air and liquid-tight flexible Pour All cover is used on every Tupperware 20 oz. Canister.

The Tupper Seal, air and liquid-tight, Pour All cover as a cover for 46 oz. cans; Tupperware Sauce Dishes and other containers of metal, glass or pottery. Foods easily dispensed without removing entire cover.

The Tupperware Wonder Bowls are usually fitted with Tupper Seal, air and liquid-tight covers.

TUPPER! Seals

air and liquid-tight, flexible covers for Tupperware Tumblers, Canisters, Wonder Bowls, Cereal Bowls and many another container of glass, metal and pottery, the contents of which it is desired to keep fresh and wholesome.

TUPPER!

FORMAL NOTICE! 9th November, 1949

EXCLUSIVE!

U. S. Patent #2,487,400

The Tupper Corporation has attained a position of leadership in this industry by incurring great expense and expending painstaking effort in the development, design, manufacture and exploitation of its many world-known products.

The Tupper Corporation further has anticipated the inevitable attacks to which leadership is subject and has taken measures provided by law to preserve the creative rights to its products, methods and design by patent protection both in the United States and abroad.

Tupper Seals for Tupperware shown in this advertisement are just a few of the forms covered in this manner and are specifically covered by U.S. Patent #2,487,400.

Only the Tupper Corporation, by U.S.Patent #2,487,400 has the right to make, use and vend container closures in connection with any and all types of containers throughout the United States and its territories as covered by the claims of the Patent.

Tupper Corporation will protect, according to law, the exclusive rights above granted

TUPPER CORPORATION

There's a Tupper Seal, air and liquid-tight flexible cover for Tupperware 2, 5, 8 and 12½ oz. Tumblers too, and these Tupper Seal, covers fit many other containers of metal, glass and crockery.

The Tupper Seal, air and liquid-tight flexible Por Top cover, specially designed as a dispensing cover for specified diameters of containers holding foods such as syrups, salad dressings, catsup.

The cover of the Tupperware Bread Server which serves as a bread tray also is designed to give similar results as Tupper Seal, air and liquid-tight Flexible covers. Keeps contents fresh as no other such container.

When equipped with Tupper Seal, air and liquid-tight, flexible covers, Tupperware Cereal Bowls serve many another purpose.

The Tupper Seal, air and liquid-tight flexible cover made for Tupperware 8 oz. Tumblers also fits and is sold with all Tupperware Funnels as a base when funnels are used as storage containers.

TUPPER CORPORATION

Manufacturers of — CONSUMER, INDUSTRIAL, PACKAGING AND SCIENTIFIC PRODUCTS

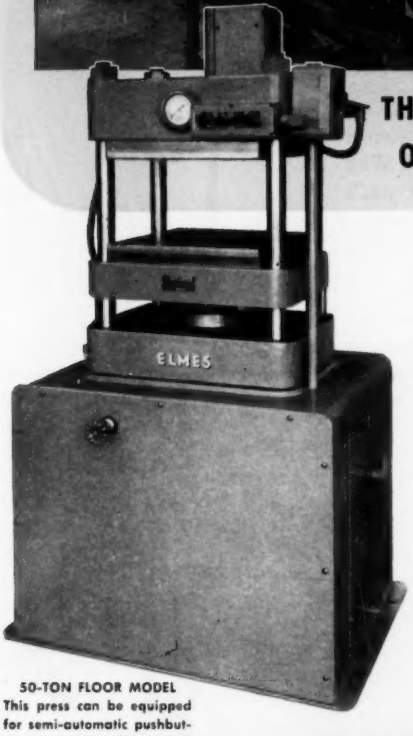
FACTORIES: Farnumsville, Mass., and Cuero, Texas **New York Show Rooms 225 Fifth Ave.**

ADDRESS ALL COMMUNICATIONS TO: Department M-2

ELMES HYDROLAIRS®

Battery of 50-Ton Elmes Hydrolairs at Yonkers plant of Otis Elevator Company.

THE ANSWER TO LOW COST, HIGH QUALITY OUTPUT FOR *EVERY* PLASTICS MOLDER



50-TON FLOOR MODEL
This press can be equipped for semi-automatic pushbutton operation as illustrated.

Many a plastics molder can tell you that Elmes Hydrolairs are the most economical of all small hydraulic presses . . . in purchase price . . . operation . . . maintenance.

You start saving at first cost, as Hydrolairs have no pumps, no motors. They take their power *entirely from the shop air line.* Absence of motors and pumps means less weight, less maintenance. Yet with full hydraulic operation, Hydrolairs give a continuous high pressure stroke at predetermined ram pressure. The pressure you select is applied and automatically maintained for the desired time interval—even on compressible materials. Anyone can operate a Hydrolair!

Air requirements are negligible. There's no worry about foundation or floor loads. Hydrolairs are easy to install and move. For long runs or short, these simple, durable presses are ideal for every molding job within their size and capacity range. Made in 30 ton bench model and 30 and 50 ton floor models. Your Elmes Distributor can give you full details, or write for your free copy of Bulletin No. 1036-A. There is no obligation.

American Steel Foundries

ELMES ENGINEERING DIVISION

1159 TENNESSEE AVENUE CINCINNATI 29, OHIO

DISTRIBUTORS IN PRINCIPAL INDUSTRIAL CENTERS —— ALSO MANUFACTURED IN CANADA

METAL-WORKING PRESSES • PLASTIC-MOLDING PRESSES • EXTRUSION PRESSES • PUMPS • ACCUMULATORS • VALVES • ACCESSORIES

Is sewing vinyl raining out your profits?

WELD VINYL ELECTRONICALLY ON

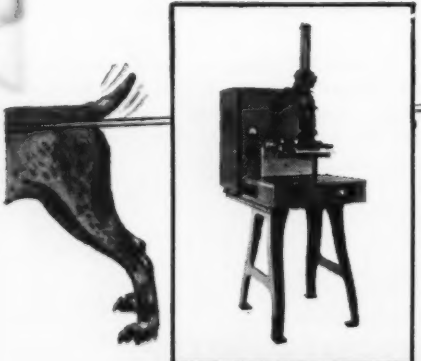
Thermatron

HIGH FREQUENCY SEALING AND HEATING EQUIPMENT

The very *chemistry* of vinyl film suggests sealing it electronically . . . a *welding* process that produces a permanent, waterproof bond without those weakening perforations resulting from ordinary sewing. Naturally, the welding of plastics calls for THERMATRON equipment, pioneer in the field.

Fortunately for the vinyl fabricator, the technically correct sealing method is the fastest and least expensive! With THERMATRON electronic generators and presses you'll "run rings" around your present production costs. Imagine sealing almost any plastic product you can name *in seconds* . . . and doing it better and cheaper with less labor!

THERMATRON sales engineers would like to show you how installation of this modern production equipment can pay off quickly with only a reasonable capital investment, and without the need of specially skilled operators. Write or phone us now, and ask for Bulletin No. 64.



Thermatron
DIVISION

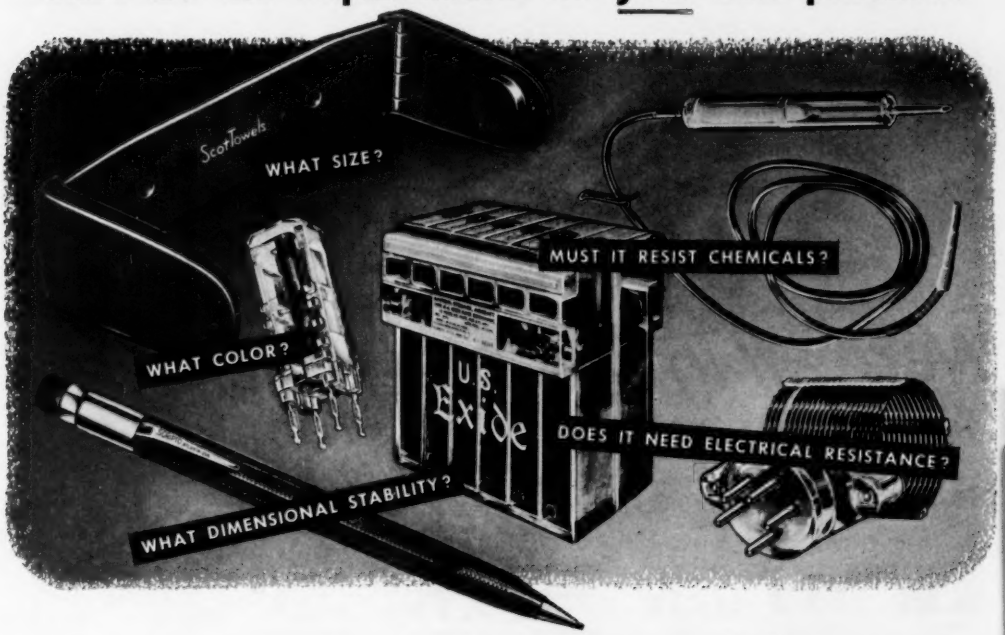
Standard THERMATRON models from ¼ KW to 6 KW weld vinyl from .002" to .080", serving most requirements—or we can build to special application. Equipment also available for sealing cellulose acetate, and for electronic gluing of furniture and other wood products.

RADIO RECEPTOR COMPANY, INC.

Since 1922 in Radio and Electronics

SALES DEPT: 251 W. 19th St., New York 11, N. Y. • FACTORY: 84 N. 9th St., Brooklyn 11, N. Y.

What are the requirements for your new product?



It will pay you to investigate Koppers Polystyrene!

WHEN YOU ARE CONSIDERING your product's appearance, durability, use, customer appeal and final cost, you should also consider the unusual adaptability of Koppers Polystyrene. It can be molded in practically any shape . . . its dimensional and heat stability assure exact fit between related members . . . it has high dielectric strength . . . beauty and stability of its color are unrivaled.

From the technical viewpoint, the excellent molding characteristics of Koppers Polystyrene result in fewer weld lines, improved strain pattern, more uniform plasticizing of material in the cylinder, faster molding cycles resulting from setting at higher temperatures, and a more uniform cylinder feed.

Write for further information. As always, we want to work with you to obtain the best results from your use of Polystyrene . . . to solve your particular molding problems . . . to design new products to be made from Koppers Polystyrene.

Koppers Polystyrenes give you all these advantages

Low cost
Light weight—more pieces per pound
Excellent dimensional stability
Excellent electrical properties
Heat-distortion temperature range: 165°-200°F.
Good chemical and moisture resistance
Tasteless and odorless
Unlimited color range

Koppers Plastics make Many Products Better and Many Better Products Possible.

KOPPERS

KOPPERS COMPANY, INC., Chemical Division, PITTSBURGH 19, PA.

SALES OFFICES: NEW YORK · BOSTON · PHILADELPHIA · CHICAGO · DETROIT · LOS ANGELES

TODAY...

We're all in the steel business!

FOR EACH OF US TO *GET* MORE STEEL . . . AND PRODUCTS MADE OF STEEL . . .
WE'VE GOT TO *PROVIDE* MORE SCRAP TO *MAKE* THE STEEL.

Half the melting stock used in the steel mill or iron foundry consists of iron and steel scrap. In normal times, enough scrap is produced by the mills, foundries, railroads, fabricators and scrap dealers to fill the need.

But now the mills have stepped up capacity to meet the greatly increased military and civilian demands for steel. And that increased capacity has outstepped the supply of scrap.

That is why we are calling on plants in both metal-working and NON-METAL-WORKING industries to provide the needed scrap NOW.

You have the heavy scrap needed to make more steel

Enough obsolete machinery, equipment and parts are being carried as useless inventory to give a big push to the production of steel. Surveys have proved this.

The trick is to get that old steel into the hands of the steel producers.

We're putting that job up to you.

To help maintain steel production... provide more steel for the equipment you want . . . turn in your idle iron and steel to your local scrap dealer.

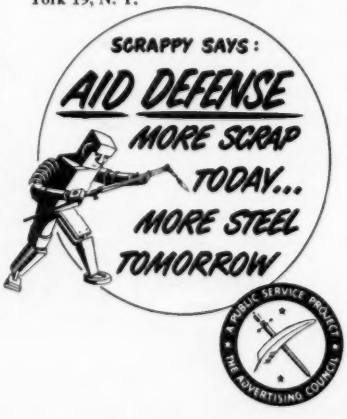
What you can do to help maintain steel production

1. Appoint one top official in your plant to take full responsibility for surveying the plant and getting out the scrap.

2. Consult with your local Scrap Mobilization Committee about its program to help out in the scrap crisis. For chairman's name, check with your Chamber of Commerce, or the nearest office of the National Production Authority, Department of Commerce.

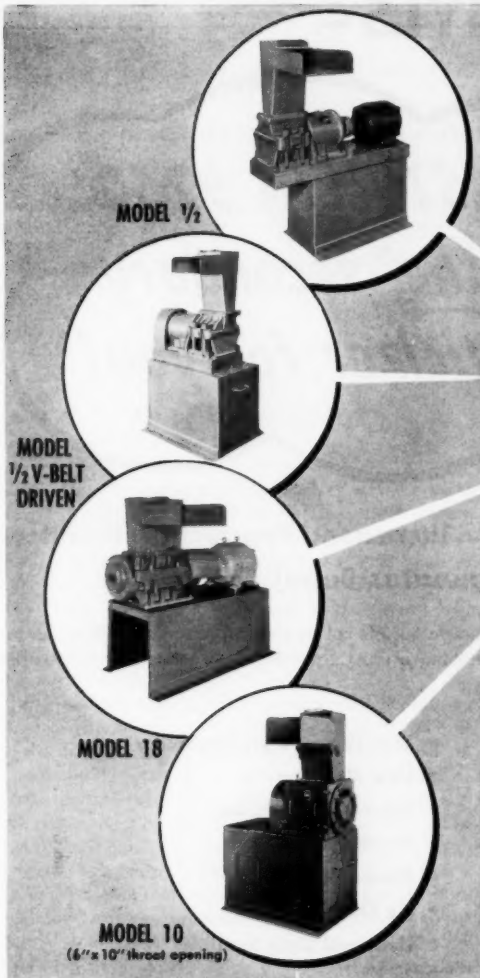
3. Call in your local scrap dealer to help you work out a practical scrapping program. Non-ferrous scrap is needed, too.

4. Write for free booklet, "Top Management: Your Program For Emergency Scrap Recovery", addressing Advertising Council, 25 W. 45 St., New York 19, N. Y.



This advertisement is a contribution, in the national interest, by

MODERN PLASTICS, INC.



There's a

CUMBERLAND GRANULATOR

that's *RIGHT FOR YOU!*

YOU'LL G… …ALLY WITH A CU… …THAT'S BUILT-FOR-THE-JOB.

Each granulating job in your plant has its own specific problems. Only a granulator that's built-for-the-job can do the job most efficiently.

Whether you granulate combs or television cabinets, brittle or elastomeric materials, there's a Cumberland granulator designed to meet your needs. Each machine is easy to operate, easy to clean, and extremely rugged.

We'll be glad to help you analyze your needs and recommend the granulator that's exactly right for you!

For more information, write for Bulletin 250.

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Modern Plastics BULLETIN

January 19, 1952

Plastic Sales in 1952

The Ides of March are now looked upon by many sales managers in the plastics industry as the crucial point of time for determining whether or not future plastics sales are going to go up or down. The general feeling is that inventories of finished plastic goods in the hands of merchants and possibly finished parts (like iron handles) in the hands of customers will have been depleted to such an extent by that time that demand for civilian goods will begin to pick up in increasing volume.

Further, the general public is thought to be holding back on spending until the sad duty of paying income taxes in March is accomplished. With that load off their minds, citizens are likely to start thinking of their normal needs and unloosen their purse strings. As long as employment remains as high as it is today, people are going to have lots of money and it isn't going to remain in the sock for very long.

Various opinions seem to be that the plastics business for the next six months will be comparable to the last half of 1949. Few people in the industry were gnashing their teeth over poor business in those days but in many plastics categories production volume in the June 1950 to June 1951 era was from 25 to 50% or more over 1949. And once a champagne taste has been developed it isn't so nice to go back to beer.

Where are Plastics in Defense?

A more ominous portent than the failure of citizens to spend their money could be the failure of defense production to actually get going on a big scale. Much space has been devoted to that subject in this column before and practically all newspapers and magazines prate about it constantly. Undoubtedly, there will be an increase in Armed Service buying this summer, but no one has been able as yet to prove that the plastics industry will be a direct beneficiary of that spending. There is no record to indicate that large quantities of plastics will go into the military hardware to be turned out this summer. The airplane program, where plastics are used plentifully, and various other large scale programs won't be in sizable production until the fourth quarter or maybe until 1953. Airplane production, for example, is now only in the hundreds per month: it went over 7000 in 1944.

If war should break out tomorrow, the pace would be different. There are many plastics items that are still in the development stage but that would probably get into immediate and big production in war time. Camouflage material, raincoats, helmets, and several ordnance items are possible examples. Today, procurement on these classes is only piddling.

Cutbacks in Hard Goods Hurt Plastics

To add to the uncertainty of civilian purchasing and defense procurement are the cutbacks in hard goods that use plastics parts. For example, 1,895,000 passenger cars were built in the record third quarter of 1950 but there will be only one million in the first and 930,000 in the second quarter of 1952. Acrylics and butyrate felt this cut severely as far back as last November. Refrigerators were produced at from 1.5 to 1.6 million from the second quarter of 1950 through the first quarter of 1951; had already dropped to 600,000 in the third quarter of 1951. Washing machines dropped from 1.2 million to 700,000; television sets from 2.4 million to 636,000. Polystyrene and phenolics were hard hit by these declines. Cuts will be even more severe in all these catagories in the first three quarters of 1952. The housing program will be cut from one million starts in 1951 to around 600,000 in 1952. Vinyl and laminates used for furniture and furnishings will feel the effect although an ever broadening base for these materials in furniture may soften the blow.

There is some balm in these cutbacks which are caused by metal shortages. Plastics will be used to supersede metal in some cases, such as butyrate for automobile panel boards perhaps, but such changeovers will take time. This type of unbalance is going on throughout all industry, and whether or not defense production and increased civilian buying of nonmetallic items will take up the slack is a grave ques-

tion. In some respects plastics is better off than many other industries because of the constant flow of new products. Then, too, there are items such as plastics pipe, for example, that have suffered no visible adverse effects from the cutback programs. Perhaps the coming six months will bring the opportunity awaited by engineers to burst into bloom with some large molded pieces and reinforced plastics applications which have long been in bud.

Shell Molding

The intriguing interest manifest in the progress and future of shell molding for foundry casting has reached a height seldom attained for a new product or process that is dependent on a plastic resin. The reason is that the potential volume of phenolic resin used in shell molding may within 5 or 10 years exceed the volume consumed by any other outlet now known for phenolic resins. Currently the largest outlet is phenolic molding powder, which consumed a little over 100 million lb. of resin a year in 1950 and '51. It is now generally accepted in the trade that the plans to increase phenol production from the present 360 million lb. annually to over 600 million lb. by 1955 are based on a belief that the resin used in shell molding will require a large portion of the new increment of phenol.

No one can make an accurate prediction on how much phenolic resin will eventually be consumed for shell molding. The process is too new. A conservative guess would place the amount used in 1951 at 4½ million pounds. In 1952 it may hit 20 million and it could go higher if certain defense projects are switched to shell molding technique. Under normal conditions, volume might reach 65 million lb. within two or three years, but any such prediction must be cautiously weighed.

Costs Reduced

The peak use of the shell molding process may be 5 or 10 years away since new equipment and trained personnel are required. The automobile companies, one farm implement company, and the washing machine companies combined could use an estimated 185 million lb. of resin a year if they converted completely to shell molding. Even if they converted only half, the resin consumption would be startling as measured by today's output. The amount of resin that might be used by other foundries and metal fabricators can only be a wild guess for no one knows how many will actually convert. However, the process seems to be such a reasonable method for reducing costs that any firm making multiple castings from a given pattern will be competitively handicapped if it sticks to the conventional sand mold process.

The operating figures are something like this: It may be assumed that about 10 lb. of sand-resin mix is required to produce a 50 lb. iron casting. The amount of resin may vary from 5 to 10%, but tends to the lower quantity. An average figure could thus be approximately 0.0125 lb. of resin for every lb. of casting. An automotive or a major farm implement company producing 500,000 tons of castings in a year could thus use over 10 million lb. of resin. At maximum use the figure might be anywhere from 10 to 70 million lb. a year per company. The reader should be cautioned at this point that these are optimum figures for individual concerns and would depend upon each company's degree of conversion.

Automatic Machinery

One of the spearheads in this drive for shell molding is Dr. E. I. Valyi of New York City, whose company, Shellmold & Machine Co., has designed automatic machinery which it is claimed will put shell molding on a mass production basis. One of the machines is a single station unit 8 ft., 4 in. high, 9 ft., 6 in. long and 7 ft., 6 in. wide, with a molding or pattern area 26 by 41 inches. It is air or hydraulically operated and will accommodate patterns up to 3000 lb. in weight. The machine alone costs about $20,000 but total equipment cost would be in the neighborhood of $40,000. About a year is required for a big company to make a switch-over from conventional casting and get into complete operation with such a machine. The possibilities of casting 120 different automotive items by shell molding are now under study.

Mention of this equipment is made here because many persons in the industry believe that such machinery will considerably speed up the adoption and volume of the shell molding technique. Smaller foundries, and even some of the big ones, may use homemade or other non-automatic equipment that will cost only a few thousand dollars. This latter type of equipment may be expected to perform at a rate of about 12 small molds in one hour, compared to 40 or 50 larger molds per hour on the big machine. Based on actual net molding output, the big automatic machine requires less labor and space since smaller equipment is designed to perform each operation separately and must be spread out over a fairly large area. Furthermore, personnel in small foundries often have to be coached and instructed over a rather long period, while the large firms have expert technicians and means for teaching them more quickly. However, many comparatively small foundry plant managers have an idea that adoption of this new method may make them big in a hurry and are anticipating entry into the field as soon as possible.

Precise as Precision Casting

Another interesting angle is that the boosters of shell molding claim that it can be as precise as precision casting. A possible aftermath of the attainment

of such high accuracy could be that parts for precision type machine tools could be shell molded and thus lower the cost of the machine; on the other hand, if shell molding is as precise as claimed, there will be less need for precision type machine tools!

Still another thought for the future that cautious souls must ponder over. If shell molding becomes universally adopted it will, of course, lower foundry costs considerably. But if and when those costs are leveled off throughout the industry, processors will then start trying to reduce that level even more. Naturally, they will look at the resin because the resin will represent a sizable portion of the cost of the operation. Already it has been said that certain petro chemicals may possibly be used to extend the phenolic resin in sand molds, thus reducing the phenolic percentage of the sand-resin mix. No one yet has had much time to work on this possibility. However, it seems likely that a certain portion of the mix, even though a minute portion, must always be phenolic because of its bonding and heat resistant values.

Resin is Simple Type

Trade talk is that Ford and Walworth are now the largest companies actually engaged in sizable shell molding operations, but all the automotive companies are at least highly interested. There are possibilities that it may soon be recommended for certain Armed Forces programs. If that happens, rather rapid expansion of the process may be expected. The phenol-formaldehyde resin used is one of the more simple types and if the new phenol plants come in as expected there should be little trouble in supplying the amount of phenolic resin needed for shell molding.

Body Armor for Soldiers

Continuous study on the use of plastics for body armor has been going on in the Armed Services ever since the beginning of World War II. Flak-stopping suits made of around 32 plies of stitched nylon were tried out by naval airplane pilots, but they were never universally adopted. Doron plates (polyes'er-glass) were under intensive study and investigation when the war ended.

The Army is now said to be ready to equip a full regiment in Korea with a laminated nylon fabric armor about ½-in. thick that will protect the body from the waist up. A study on wound ballistics by the Medical Corps indicates that the greatest incidence of wounds is in that area of the body. The nylon armor will protect against flying fragments and even against bullets that are near the end of their trajectory. The test is to be made as the culmination of years of research to determine actual performance under combat conditions. Also it will show whether or not men can or will wear the armor for protection and without impediment to free action in the field.

The experimental armor uses the same materials as the new experimental plastic helmet liner but is processed by a different method. Victory Plastics Co., Hudson, Mass., has fabricated the experimental armor. The compression molded helmet mentioned above looks like an almost certain bet for adoption some time in the future, but final approval may be a year or more away. The same thing goes for the body armor. Even if the armor works out satisfactorily in Korea, it will be a year or more before procurement gets under way.

Doron armor is basically made up of laminated polyester-glass plates inserted in a fabric cover. The greatest objection to date seems to be its bulkiness, but the Navy has not given up on it as a possible protection for Marines on combat duty and it is entirely likely that its use may eventually be approved under certain conditions.

Polyethylene in January

Requests for polyethylene in January were 265% of available material. Despite this exorbitant demand, there has been very little noise around the industry concerning a shortage. Such quiet acceptance of a situation probably indicates that customers were at least fairly well satisfied. Belief is prevalent that the above demand is exaggerated, that when sifted down to actual need it would be from 150 to 175% of actual production. The amount available for distribution in January was about one third more than in June 1951 when polyethylene went on allocation. Officials believe that when availability reaches 50% more than in January, the material can be taken off allocation.

January production was distributed 35% to military; 33% to essential civilian; and 32% by the producer or "free." Military use was up 3% from December despite the increased amount of polyethylene available. Essential civilian distribution was down about 3%, partially because film for frozen food packaging was withdrawn from allocation and put on the "free" list. It is believed the government made the switch because some of the film allocated for frozen food was getting into other fields.

More Polyethylene on the Way

February and March will probably see less material available, since the producers will partially shut down for a couple of weeks while making arrangements to bring in new increments. April will see an improvement — production at that time may approach almost half again as much as there was in June 1950. Producers have been working hard and successfully to bring in additional supplies. That they

obtained new equipment to make this increase possible is almost a miracle.

It will be interesting to watch what happens in April when the new quota comes in. Military volume will probably increase but there should still be considerably more for civilian use. The industry hasn't forgotten how the big increases were swallowed up two years ago in two or three months' time. More new facilities will be added in the third quarter of 1952 if all goes well — may come near to doubling present capacity.

Why Scramble for Steel?

One of the most peculiar situations ever witnessed by an observer who has been watching Washington happenings for 20 years is the present rambunctious, hell-bent-for-leather scramble going on to get structural steel, copper, nickel, etc., for plants to produce more chemicals, when many of those same chemicals are already in good supply. Other industries are doing the same thing. The obvious answer is that these materials would be needed quickly in event of war; it's part of the plan to provide both bullets and butter. "Everybody's Doin' It!" It may also be symptomatic of the mad confusion that has grown out of trying to plan an economy that would superimpose a war production machine on top of a normal civilian production plant that was already starting to burst at the seams before Korea.

Metal Cutbacks Delay Chemical Plants

Regardless of the reason behind the scramble, the facts seem to be that the chemical industry is going to have even less chance of getting building and equipment materials in the second and third quarter of 1952 than they anticipated. Copper is scarcer than steel and the third quarter metal allocations will interfere more with new plant building than expected because of the demand for copper in defense. Any alleviation of the copper and nickel shortage is a long, long way in the future, we are told. Allocations of metal for chemical plants in the second and third quarter will be based largely on the present status of the structure. A plant that is 80 or 90% complete stands a better chance of getting metal than one that is only 40% complete. A plant that isn't started at all is almost completely out of luck.

What Plants May Get Steel

But there are exceptions. Plants which will produce some items still regarded as vital because of possible shortages may get metals to start; that is, they will have a chance at any steel or copper that may be allocated to chemicals. Such plants would include those to produce such items as benzol, fluorocarbons, naphthalene, polyvinyl alcohol, sebacic acid, and silicones.

Then there is another list of chemical producers which may get structural materials if the plants are over 49% completed and if any is left over from the above categories. This group includes producers of acetylene, acrylonitrile, chlorine, nylon, phenol, phthalic anhydride, polyethylene, vinyl acetate, butyrate and chloride, styrene monomer, and polyesters.

Another possibility is plants which are only 20% complete but which require less than 100 tons of steel to finish them. Plants for chemicals such as polystyrene which are not on either list may or may not get enough metal to finish construction. Several polystyrene plants now almost completed may remain for some months in their present unfinished state. There are some unfinished chemical plants started before CMP was even initiated that are now at a standstill. Between 20 and 30 jobs on the chemical program received no structural steel in the fourth quarter of 1951 or the first quarter of 1952 and they probably won't get any in the second.

The result of all this uncertainty is a constant stream of business men flowing into Washington to try to show how important their own projects are in comparison to others. Even in chemicals that are fairly plentiful, there is a mad rush to get on the bandwagon; no one wants to be the last to come in with his product. Most of the companies have also applied for tax amortization and are anxious to get the five-year tax payoff that a TA permits. The TA also acts as a type of priority since, supposedly, none are given unless the product to be made is a wartime necessity.

Building for Future Demand

The present lull in the chemicals and plastics industry doesn't seem to scare off the applicants one whit, although one producer remarked that, in his opinion, if all the steel asked for were to appear suddenly, demand would be far less than is presently apparent. However, most chemical men feel that the present lull in chemicals is only temporary and that big expansion is justified for future civilian needs alone. They feel that defense production will create a vacuum in civilian demand for millions of dollars worth of hard goods in particular. The public doesn't realize this as yet because the impact of the cutbacks has not been felt so far. But if present planned curtailment of autos, refrigerators, etc., lasts for any length of time, a huge reservoir of civilian demand will be built up, just as it was during World War II. Then, after the defense program is completed, there will again be a great buying surge capable of employing all presently planned facilities, except of course those that are specifically built for war production use only.

MODERN PLASTICS

VOLUME 29 FEBRUARY 1952 NUMBER 6

WHY RUBBER-PHENOLICS?

Blends take advantage of desirable characteristics of each material, open new job possibilities for compression molding

EVER since Baekeland first produced phenolic resins, the rubber industry and the phenolic section of the plastics industry have been yearning to wed rubber and phenolic. The rubber industry wanted the hardness, strength, and short cure of the resin; the phenolic industry needed some of the toughness inherent in an elastomeric polymer.

The dream could not be realized with natural rubber because it was not sufficiently compatible with phenolic resins; at best, blends of the two materials were not uniform. But the development of Buna-N or acrylonitrile-butadiene rubber produced a material which was compatible with certain phenolic resins.

The first molding materials to come out of the union were rubber with a little phenolic added; the first moldings were made by hard rubber molders. Experimentation, chiefly by B. F. Goodrich Chemical Co., Durez Plastics & Chemicals, Inc., and General Electric Co.'s Chemical Div., gradually brought forth rubber-phenolic compounds with less and less rubber and more and more phenolic, and created a new material for compression molders.

Today, Durez, General Electric, and Synvar Corp., are the main makers of rubber-phenolic plastic molding compounds. They take Hycar nitrile rubber made by Goodrich and Paracril made by U. S. Rubber Co., and add different fillers. U. S. Rubber takes its own nitrile rubber and compounds it with purchased phenolic to make Enrup, which it then molds and fabricates into finished industrial components.

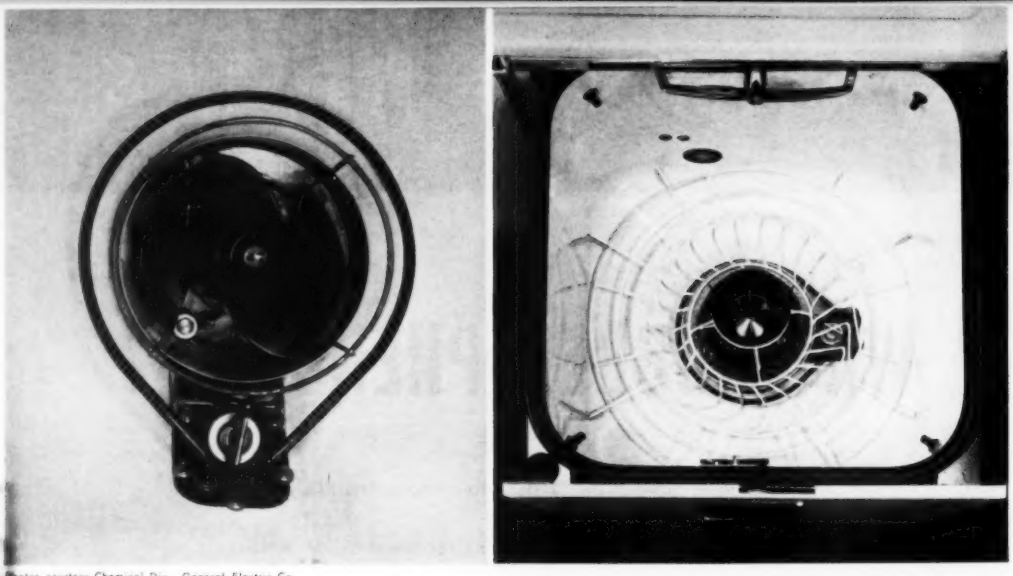
Competitive Properties

The rubber-phenolics have interesting properties which permit them to compete with metals, wood, ceramics, thermoset laminates, and straight phenolic molding materials. They generally mold well in molds that have been constructed for general-purpose phenolic materials. Mold shrink allowance is sometimes a more intangible factor than for other phenolics but a full scale of shrink allowance has been established for some of the blends.

An inherent characteristic of rubber-phenolics is the relative resiliency of the material on release from

Photos courtesy Chemical Div., General Electric Co.

Fig. 1—Air circulator (left) has impact resistant base (above) molded of rubber-phenolic



Photos courtesy Chemical Div., General Electric Co.

Fig. 2—Dishwasher impeller (shown close-up at left and in place under the washer rack at right) is now molded of rubber-phenolic, and has five times the impact strength of former impellers. In addition, it is not affected by either hot water or detergents

Courtesy Auburn Button Works

Fig. 3—Rubber-phenolic eye cups on safety goggles can withstand riveting

the mold; and the design and location of knock-out pins has to be carefully considered. In parts requiring great accuracy, shrink fixtures are frequently used. It is the opinion of at least one molder that parts molded of rubber-phenolic might well be afterbaked to relieve strain.

It has been found by three molders interviewed that an almost imperceptible film deposit is created on the surface of molds after repeated cycling; and it is recommended that molds be chrome plated to aid in part release and to prevent sticking. Heat also presents a problem in that it is more critical; the best molding temperature is reported to be between 340 and 350° F. Cycles may be up to 20% longer than for standard phenolic materials, and minimum pressures should be used commensurate with the proper density of the molded part.

The rubber-phenolic molding compounds are ideally suited for transfer or plunger molding, because they are fundamentally soft and have a long duration of flow.

As to design of molded parts, the problems are actually minimized, because the parts don't need as

Photos courtesy U.S. Rubber Co.

Fig. 4 (far left)—Big gear blank, molded of rubber-phenolic, is 30-in. in diameter and 4-in. thick. Fig. 5 (left) — Rubber-phenolic roller skate wheels outwear wood or fiber ones at least 3 to 1

much reinforcement from the standpoint of ribbing or fluting, or excess radii at corners, or thicker sections, as do standard phenolics. However, depending on the composition of the compound, they will naturally react more like rubber under stress and strain.

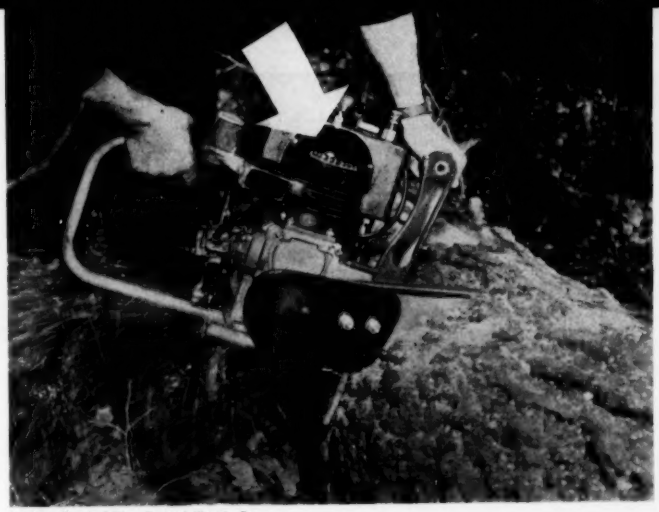
A complaint about rubber-phenolics—that it was difficult to get consistency in the material and like consistency in molding cycle time, week in and week out—is being lessened as more and more production of these materials is achieved.

Impact Strength vs. Price

Naturally, the most important reason for using rubber-phenolics is to secure impact strength at reasonable cost. So resistant are rubber-phenolics to impact that the standard Izod and Charpy tests do not give true indications. General Electric therefore developed a drop-ball test whereby repeated shock is applied to a test specimen, first up to breaking point and then up to total destruction.[1]

A prime example of the advantage of rubber-phenolics from an impact standpoint is in the bases for air circulators (Fig. 1), manufactured by the W. W. Welch Co., Cincinnati, Ohio, which are molded from G. E. wood-flour-filled rubber-phenolic by Cambridge Molded Plastics Co., Cambridge, Ohio. These bases are designed to withstand accidental kicking and knocking about, as well as rough handling in shipping; the rubber-phenolic gave them impact strength and resilience ordinarily associated with conventional flock- and fabric-filled phenolics. They support the motor and housing, and a foot-operated switch is mounted in one of the legs. Since the wood-flour-filled rubber-phenolic can be preformed and finished like ordinary phenolics, there is also an economic advantage.

A combination of impact strength and chemical resistance is the reason for using rubber-phenolics (in this case asbestos-filled) in the impellers for G.E.'s automatic dishwasher (Fig. 2). This is being molded by the G.E. Plastics Dept., Decatur, Ill. With the conventional flock-filled phenolic compounds formerly used, breakage sometimes occurred when silverware was accidentally dropped on



Courtesy Chemical Div., General Electric Co.

Fig. 6—Cylinder shield (arrow) and handle (not visible here) for portable tree saw are molded of rubber-phenolic because of its heat resistance and impact strength

Fig. 7—Bobbins of rubber-phenolic are lighter, stronger, lower in final cost than wood

Courtesy Chemical Div., General Electric Co.

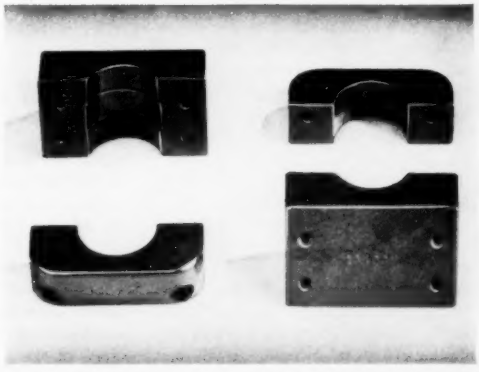
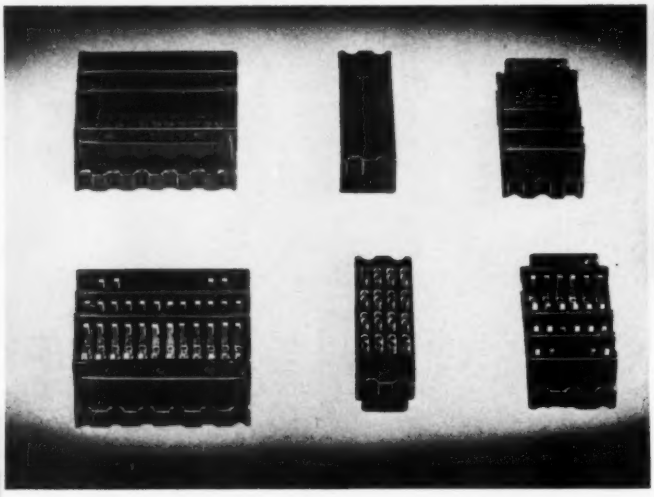
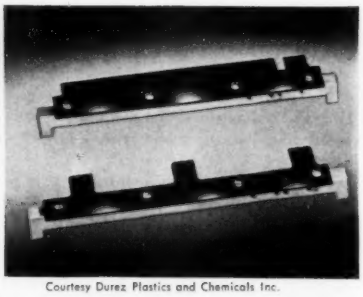


Fig. 8—Molded cable clamp for office machine replaces metal. Rubber-phenolic is more resilient than the metal, has ample impact strength for the job

[1] "The Work Horse Sets New Records," MODERN PLASTICS, *28*, 53 (Feb. 1951).





Courtesy Durez Plastics and Chemicals Inc.

Fig. 10—When molded of rubber-phenolic, index card guide won't chip

Fig. 9—Forcing contacts into rubber-phenolic blocks doesn't cause cracking

the impellers. Yet a phenolic material was indicated, because of its resistance to dishwashing detergents. Drop tests on the blades of the new impellers show that they can withstand a minimum of five times more impact than the former impellers, and neither hot water nor detergents create any appreciable loss in physical strength.

Scrap Losses Reduced

The resilience lent to the material by its nitrile rubber content has enabled Bausch & Lomb Optical Co., Rochester, N.Y., to substantially reduce scrap losses on safety goggles during assembly operations. Figure 3 shows the product and its rubber-phenolic component, molded by Auburn Button Works, Auburn, N.Y. With the formerly used flock-filled phenolic, excessive breakage occurred when the metal side-screens were riveted in three places to the plastic eye cups. Breakage during the rapid riveting operation is now negligible, and it has been found that the goggles take more abuse in service.

Wear and abrasion resistance of the rubber-phenolics, as well as the sizes and sections in which they may be made, are illustrated by the two wheels shown in Figs. 4 and 5. Both of these items are molded of U.S. Rubber Co.'s Enrup, the huge gear blank being 30 in. in diameter, 4 in. thick, and with a weight of 120 lb.; the roller skate wheels, made for Fo-Mac Enterprises, Tulsa, Okla., are less than 2 in. in diameter.

The rubber-phenolic roller skate wheel has been found to outwear both wood and fiber wheels by at least 3 to 1. The material is unaffected by temperature and humidity changes, therefore requires no metal bushing such as must be used with wooden wheels. Bearing assembly is the same for both types. And the rubber-phenolic, having no grain, wears evenly, with no flat spots or splitting.

Vibration fatigue resistance was the chief reason why Precision Equipment Co., Danbury, Conn. had Oris Mfg. Co., Thomaston, Conn., mold the cylinder shields and handles for a portable tree saw (Fig. 6), out of G.E. rubber-phenolic. In the case of the cylinder shields, which were formerly cast from magnesium alloy, the plastic eliminated machining and painting operations, and actually reduced part costs 75 percent. But there were other plusses: the rubber-phenolic shields have adequate heat resistance, plenty of impact strength against abuse in the bush, and their use decreased the weight of the saw.

Lower Use Cost

A big future use for rubber-phenolics is likely to be in replacing wood in textile machine bobbins, because of the greater strength, light weight, and lower final use cost of the plastic. Figure 7 shows a bobbin molded by Jacobus Plastics, Jacobus, Pa., for the Revonah Spinning Mills, Hanover, Pa. The wood bobbin formerly used chipped and split under rough handling in weaving mills. The new plastic bobbins can take much more abuse, are 20% lighter in weight, and permit faster calculation of shipping costs because of uniformity of size and weight.

Figure 8 shows an application where resiliency is a factor. It is a cable clamp for International Business Machines Corp., Endicott, N.Y., and was formerly manufactured of metal. The rubber-phenolic product molded from Durez material by Norton Laboratories, Inc., Lockport, N.Y., has been found to have improved flexural characteristics and is lighter in weight. Since the clamp is used on a piece of portable office equipment, the impact strength of the rubber-phenolic is also an advantage.

Other I.B.M. jobs using rubber-phenolic because of the combination of impact and flexural strengths are illustrated in Fig. 9. In this case, the properties are advantageous during assembly; with the formerly used material, it was not possible to press-fit the metal inserts without considerable cracking. These items are contact terminal blocks and are molded for I.B.M. by Consolidated Molded Products Corp., Scranton,

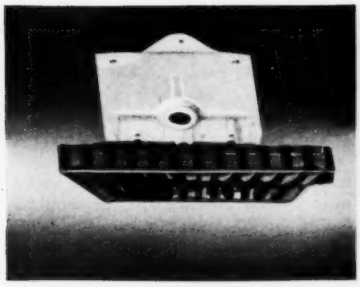


Fig. 11—Metal inserts and rubber-phenolic block can be accurately machined to desired shape after molding

Fig. 12—Rubber-phenolic gear blank is turned to size on standard lathe

Courtesy U.S. Rubber Co.

Pa., and Prolon Plastics Co., Florence, Mass. Not only are the metal contact elements successfully press-fitted into the molded rubber-phenolic blocks and crimped into position automatically, but cracking of the plastic when connector wires are forced into the contacts has been eliminated. This was a case where the design of the parts could not be changed—so a stronger material had to be used.

Specialized Problems

As an end user, I.B.M., because of its specialized problems, has become a pioneer in the use of rubber-phenolic moldings. The lower unit in Fig. 10 shows an index card guide molded from Durez flock-filled rubber-phenolic, by Norton Laboratories, replacing the impact phenolic item shown in the upper part of the photograph. Here the continual slapping of cards against the plastic would eventually cause chipping and wear, which are eliminated with the rubber-phenolic.

The rubber-phenolics in harder flows take to machining readily. The item shown in Fig. 11 is an I.B.M. armature contact, with one bronze and one steel insert, which must be machined to a special shape and tolerance after molding. The result, as can be seen, is a perfectly smooth unit, although the plastic does not amount to more than 30% of the total volume of the piece. The machining

Photos courtesy Chicago Molded Products Corp.

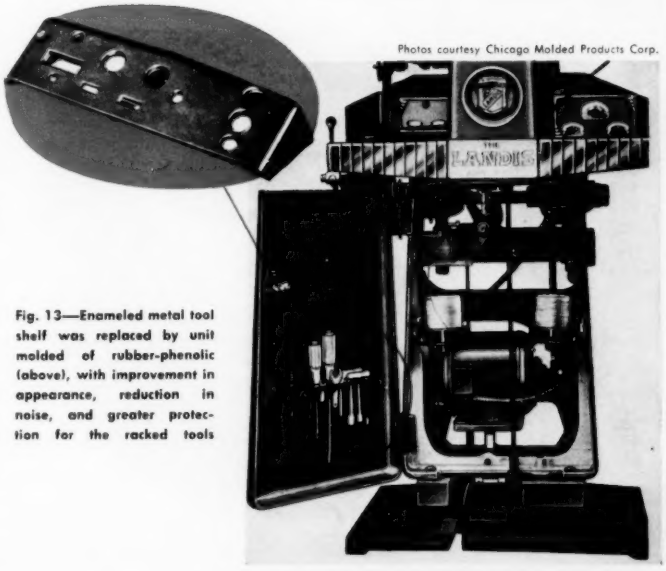


Fig. 13—Enameled metal tool shelf was replaced by unit molded of rubber-phenolic (above), with improvement in appearance, reduction in noise, and greater protection for the racked tools

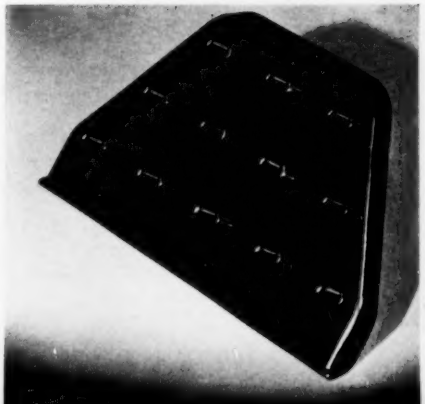
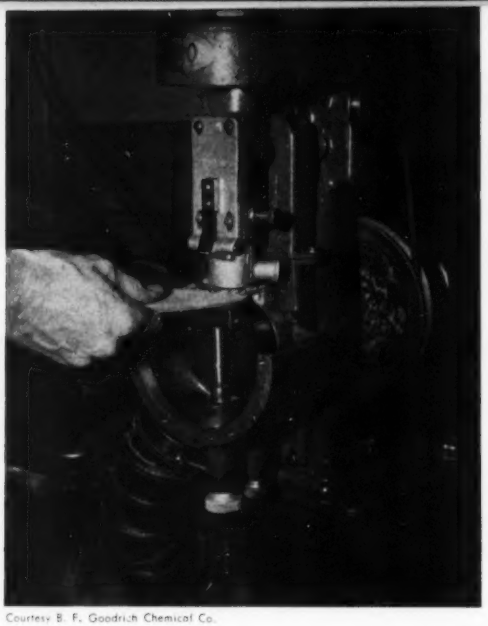


Fig. 14—Holder for circular cutters is molded of rubber-phenolic, has integrally-molded pegs. The cutters do not rattle when the machine is in use and good shop appearance is maintained



Courtesy B. F. Goodrich Chemical Co.

Fig. 15—Shoe soles are prepared for cementing on a rotary machine equipped with a rubber-phenolic roughing wheel run at high speed

properties of rubber-phenolics are further illustrated in Fig. 12, in which a gear blank is being trimmed on a lathe.

Wherever fast-moving, muscular workmen are performing roughly with tools, the rubber-phenolics seem to fit. The example shown in Fig. 13 is a tool holder shelf, molded for Landis Machine Co., St. Louis, Mo., by Chicago Molded Products Corp., Chicago, Ill., using G.E. rubber-phenolic. When the shelf was made of enamelled metal, it would rapidly deteriorate in appearance, would be far noisier, would be subject to vibration fatigue, and tool edges might be damaged. In fact, the former metal part had to have the openings lined with felt to save the tools. When the switch was made to rubber-phenolic, marked production economies resulted. The plastic item has stood up so well that Landis is using other parts of rubber-phenolic from the same molder. An example shown in Fig. 14 is a holder for cutters and setters, with integrally-molded pegs. This part was originally made of wood, then in conventional phenolic material; but it was found that the vibration of the machine caused the circular cutters to vibrate, making an objectionable noise. Rubber-phenolic eliminated the noise and permits maintenance of good appearance at the machine.

Another shoe machinery company, Compo Shoe Machinery Corp., Boston, Mass., is using rubber-phenolics for their abrasion and chemical resistance. Figure 15 shows the rubber-phenolic wheel on a rotary roughing machine, which handles up to 3600 pairs of soles a day. This rubber-phenolic roller feeds the soles into the machine; by changing the hardness of the rolls, any type of soling material may be handled.

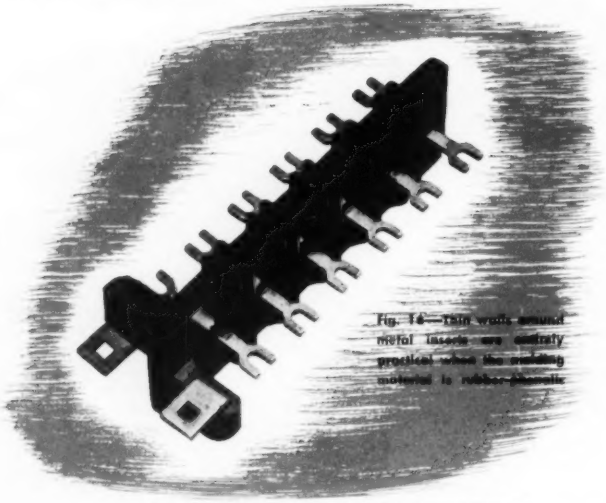


Fig. 14—Thin walls around metal inserts are entirely practical when the molding material is rubber-phenolic

Photos above and below courtesy Chemical Div., General Electric Co.

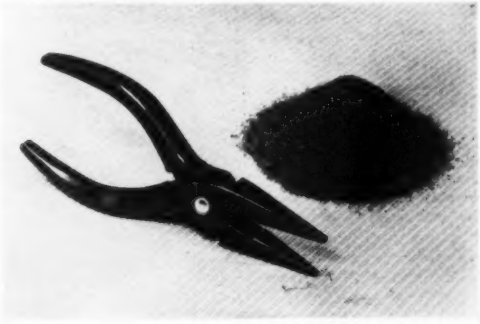


Fig. 17—The electrical properties of rubber-phenolic, plus mechanical strength, are utilized in transfer molded pliers

Thin Walls

A big problem with all previous phenolic molding has been that of putting thin walls around large inserts; here the difference in thermal expansion of metal and plastic has frequently caused disastrous cracking of the plastics after molding. Figure 16 shows a bus bar molded by Plastic Molding Corp., Sandy Hook, Conn., for Murray Mfg. Co., Brooklyn, N.Y., out of G.E. rubber-phenolic. This application was designed specifically for the new material. The wall thicknesses around the insert is

less than $\frac{1}{8}$ in., and the ratio of metal to plastic is two to one by weight. Apparently, the knitting action of the rubber-phenolic was a help in doing the molding, since the material adheres well to the insert, insuring complete insulation.

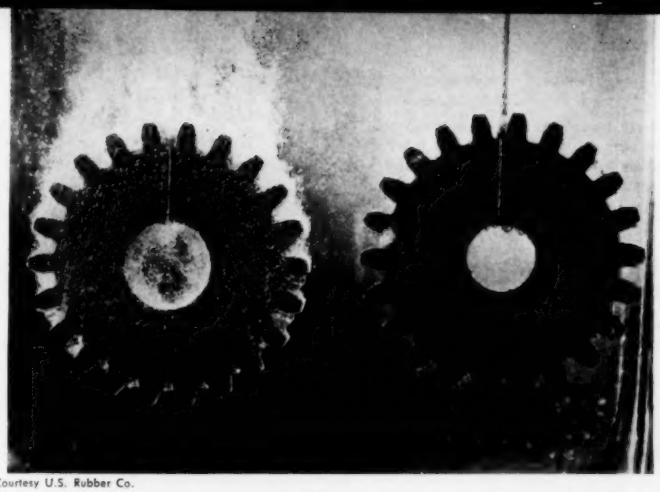
Rubber-phenolics would naturally be expected to have good electrical properties. They are used in the television and radar repair pliers, molded by Modern Plastics Corp., Benton Harbor, Mich., shown in Fig. 17. Any good phenolic would have served, except that repairmen drop pliers from heights to concrete and hard ground. By the use of this transfer molded material in the original molds, breakage was reduced over 50 per cent.

Chemical resistance has been mentioned in a couple of cases above. In general, it is not a prime property of the rubber-phenolics, because less costly materials will do quite as well. But where impact and resilience, vibration fatigue, and good appearance, are also required, the rubber-phenolics have sufficient chemical resistance to give them an advantage. Figure 18 shows a steel gear, left, and an Enrup gear immersed in a 20% solution of sulfuric acid. The results are obvious.

The silverware container for G.E.'s automatic dishwasher, shown in Fig. 19, is molded of G.E. rubber-phenolic by Prolon Plastics. These units were formerly made of brass screen, and costs ran high because of bending in shipment and assembly. Besides this, customer complaints about the metal container scratching valuable silverware were numerous. Due to the chemical resistance of the rubber-phenolic, the original surface of these plastic containers has been retained for exceptionally long periods.

Economics, Not Cost

Neither the makers of rubber-phenolic materials nor the molders make a selling point of cost economy. The material runs 3 to 5¢ a lb. higher than similarly filled straight phenolic compounds, has a specific gravity 3 to 4% lower than conventional phenolics, and has a 10 to 20% slower cycle. But it can do a better job in some instances than straight phenolics—and in many cases can be used in the same molds. In many other instances, it can do a superior job to wood, metal, ceramics, leather, and rubber; and in these cases it can produce definite economies over the original of the application.



Courtesy U.S. Rubber Co.

Fig. 18—Chemical resistance of rubber-phenolic is dramatically demonstrated by this test in which a steel gear (left) and an Enrup gear are suspended in sulfuric acid

To sum up: You get greater impact strength; improved vibration fatigue; greater thermal shock resistance; no sacrifice in performance, moldability, or appearance; low cost assembly operations; elimination of cracking after molding around large inserts; good machinability; terrific wear resistance; good chemical resistance; and adequate electrical properties.

The rubber-phenolics are increasing in application every day. A very conservative prophet in the industry believes that within five years they can amount to from 7 to 10% of the total phenolic molding powder that will be sold at that time.

At the present time, the anticipated sales pattern for 1952 is 65% industrial, 25% military, and 10% consumer. The future will revolve around new and expanded applications in textile equipment, automotive uses, communications, home appliances, business machines.

The rubber-phenolics are worth attention—and they can deliver the goods.

Courtesy Chemical Div., General Electric Co.

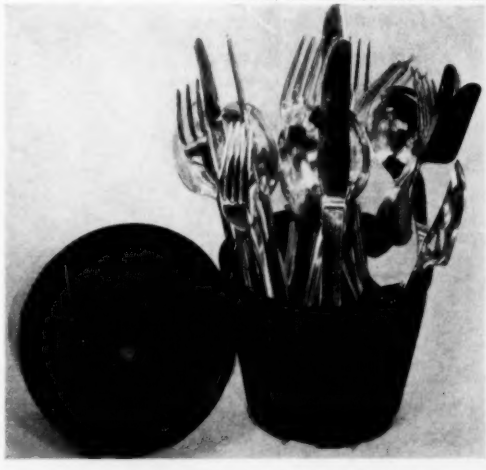


Fig. 19—Silverware container for automatic dishwasher does not scratch utensils when molded of rubber-phenolic, as did the former brass container

Right: Erosion test plots. Area at right in picture is untreated; vegetation is firmly established in treated area at left. Below: Laboratory experiment shows how treated soil does not splash

Soil Conditioning With Acrylonitrile

In infiltration test (four photographs below and facing), equal amounts of water added to untreated soil (left) and treated soil (right)

As water is poured onto the soil samples, its slaking action on the untreated soil is apparent by the slow penetration of the water

Less than a tablespoon of conditioner is used in preparing soil for potting

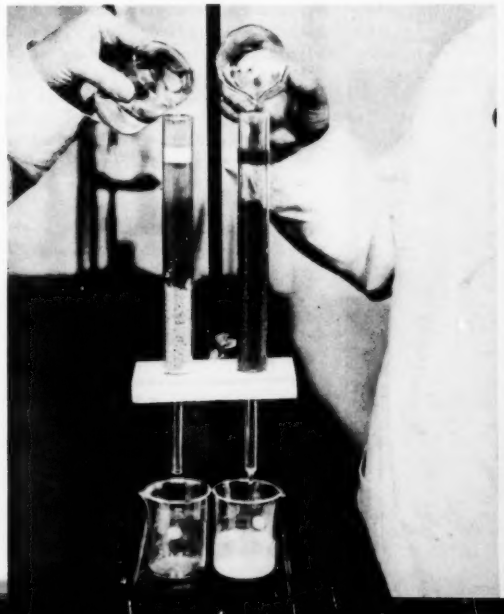
White powder form of plastic improves a wide variety of soil structures by simple mixing; it is useful in agriculture, in home gardens, and in erosion control

A TREMENDOUS potential market for plastics has recently been opened by the development of a plastic substitute for the natural humus components which are plentiful in fertile virgin soil, but scarce in poor soil. The new material, called Krilium, was developed in the Dayton, Ohio, laboratories of Monsanto Chemical Co.

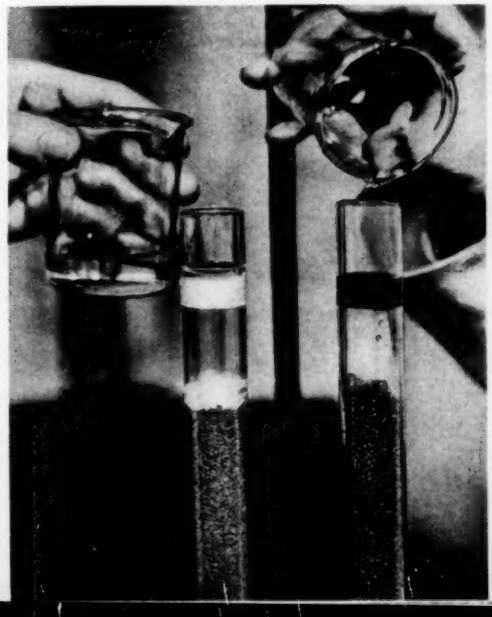
Krilium, according to Monsanto, is 100 to 1000 times as effective in improving soil structure as is compost, manures, or peat moss. It improves the soil structure, increases the aeration of the soil, provides better utilization of nutrients in the soil, improves water infiltration, makes the soil more workable, and greatly reduces erosion.

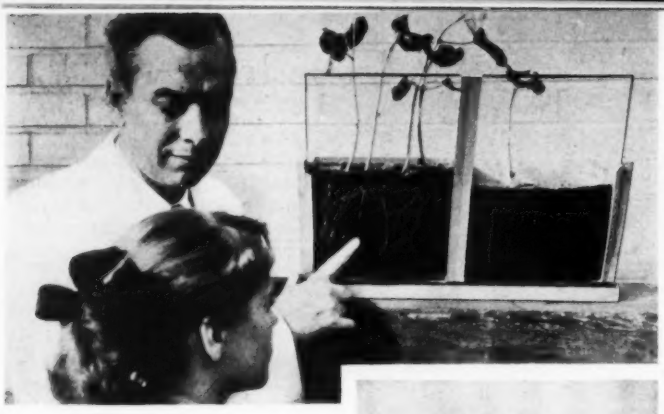
Krilium is described as a synthetic polyelectrolyte. It is made by polymerizing acrylonitrile and then hydrolizing it. In form, Krilium is a fine white powder which can easily be worked into the soil. Its primary effect is to stabilize natural soil aggregates against the dispersing or slaking action of water. In poor soils, the aggregates (that is, the clusters of soil) may range from dust particles to large clods, but these aggregates have low stability to water. When the soil dries, it

As infiltration test progresses, untreated soil obstructs passage of water; water poured on treated soil comes out the bottom unmuddied



As test concludes, the untreated soil, turned to mud, cannot absorb any more water; treated soil remains crumbly, does not get muddy





Seeds germinate better, faster; carrots grow larger, in plastic treated soil

slakes down to a shiny, crusty surface and the soil shrinks and cracks. In such soil, seeds germinate slowly or may be destroyed as they attempt to push through the surface crust.

In well-conditioned soils, on the other hand, aggregates retain an optimum size ranging from that of a pinhead to that of a pea. There is no surface crust, roots can get the air and water they need, and the spongy soil lets water reach the roots and the subsoil instead of allowing it to be lost by run-off.

Another important result of treating soil with Krilium is increased soil workability. Tillage tools move through the treated soil easily and the soil needs no further working. The treated soil can also be tilled at higher moisture levels in early spring without puddling.

The relationship of soil aggregation to crop yield is still under study. Experiments with Krilium to date have produced yield increases ranging from 30 to 100% with root crops such as radishes and carrots. A number of agricultural experiment stations throughout the country are cooperating with Monsanto in the investigation and all of the 1952 production of Krilium will go to such stations. As a result, the material will not be commercially available until some time in 1953.

The rate of application depends upon the type and degree of soil improvement desired. It can range from 0.02 to 0.1% by weight of soil. The best method of application seems to be to spread the powder on the soil surface uniformly and then mix it to the desired depth with a disk, rotary tiller, or hand tool.

Competitive in Price

One pound of Krilium has essentially the same effect on soil structure as 200 pounds of peat moss or 500 pounds of commercial compost. Krilium will probably sell for under $2 a pound, and thus will be competitive with peat moss (at 4¢ a pound) and commercial compost (at 2½¢ a pound). In addition, Krilium is more resistant to bacterial decomposition than competing materials, and may even prove to last for years.

In addition to its uses in agriculture, Krilium provides an effective and economical method of controlling rain erosion. In this application, the white powder can simply be spread on the surface evenly. After it becomes wet, it forms a water-permeable film on the surface of the ground during the period necessary for the establishment of a permanent cover crop.

Tests indicate that the surface application of Krilium is effective in treatment of a wide variety of soil types. Its economic advantages over the various surface mulches widely used in erosion control include its ease of application, lack of flammability, resistance to wind, and savings in transportation and storage costs in areas where mulches are not readily obtainable.

It is interesting to note that Krilium not only controls the loss of soil by run-off, but also prevents splash erosion. It thus could be used effectively around the foundations of houses to prevent drippings from the eaves from spattering the side of the house with mud.

Monsanto and the research organizations cooperating with it are now working on applications of Krilium in a number of other fields.

Hard crust on untreated soil (right) retards seed germination. Treated and untreated soil areas below were both planted at the same time, watered in the same manner

S.P.I. Film and Sheeting Conference

Abstracts of papers presented at the Third Conference, reporting progress and trends in processing, equipment, and marketing

NEW markets, merchandising trends, and improved techniques in processing were the principle subjects discussed at the Third Conference of the Plastics Film, Sheeting, and Coated Fabrics Div. of the Society of the Plastics Industry held at the Commodore Hotel, New York, N. Y., on December 13 and 14, 1951. The meeting was attended by 453 representatives of firms in the vinyl industry.

Abstracts of most of the papers given at the meeting follow. Complete copies may be obtained from The Society of the Plastics Industry, 67 West 44 St., New York, N.Y.

Plasticizer Migration

Methods and tests for studying plasticizer migration were outlined in a paper, "A Study of Plasticizer Migration," delivered by J. R. Geenty of Goodall-Sanford, Inc. Mr. Geenty said that the method of test he described is simple to perform, that reproducible results can be obtained, and that it is quite accurate and practical. Film, sheet and coating stripped from fabric can be tested by this method.

Vinyl in the Auto Industry

Ever since the introduction of Versilan upholstery by the Landers Corp. in 1942, vinyl coated fabrics and sheets have been used by the automotive industry in ever-increasing quantity, according to Dr. A. J. Carter, Rubber and Plastics Laboratory, Chrysler Corp.

In his paper, "Vinyl Film, Sheeting, and Coated Fabrics in the Automobile Industry," Mr. Carter pointed out that heavy coated vinyl fabrics are now the main trim materials for truck seats and backs because they have stood up so well under this rugged service. The Plymouth station wagons or suburban cars use 24-oz. coated sateen for 15 different parts; 12-gage vinyl sheet for 8 different parts. The Chrysler four-door sedan uses 24-oz. coated fabric in 11 different applications. In all Chrysler lines 30-oz. or heavier material is being used for seats.

One of the principle problems at Chrysler, insofar as vinyl sheet or coated fabric is concerned, is tackiness and cold flexibility. The drier the film, the poorer the cold resistance. For civilian application, flexibility at −40° F. after aging is a must. Mr. Carter asked that the resin and plasticizer manufacturers as well as fabricators give considerably more thought and experimentation to this great problem. He also expressed the opinion that eventually some one will come up with a sound and improved vinyl convertible top material.

Radiant Heat

The paper, "Radiant Heat for Vacuum Forming, Fusion, and Embossing," by Dr. Geoffrey Broughton, Dept. of Paper Engineering, Lowell Textile Institute, was of particular interest to engineers concerned with the technique of applying heat to plastics—especially film, sheet, and fabric coating. He pointed out that heat transfer by radiation offers the possibility of uniform application from a source some distance from the plastic to be worked, allowing its ready addition to many types of machinery. Gas flames, infra-red lamps, strip heaters, and fibrous glass covered wire heaters have all been used as sources of infra-red radiation.

After Dr. Broughton's talk, E. Bowman Stratton of Industrial Radiant Heat Corp. explained how his company's equipment, including a vacuum forming press which he helped to design, applies the principles of radiant heating.

Market Trends

Such vinyl products as rainboots, place mats, dresser sets, closet accessories, upholstery material, yard goods, baby bibs, and training pants have gained considerable sales appeal over the last two years, said Joseph R. Rowen of W. T. Grant Co., in his paper, "Marketing Trends in Retailing Plastics Film and Sheeting." To solidify gains, he advocated: a) less emphasis on printed patterns and more on styling; b) maintaining price advantage; c) keeping to a 10% tolerance in film gage; d) avoidance of confined patterns which are not, in fact, confined; e) more information for the public, particularly on gage; and f) an expansion of creative ideas.

Mr. Rowen warned the industry that the mushrooming stage of growth in the vinyl field is nearing an end, and the time for solidifying gains, planning, and building is now at hand.

At the same meeting, Lurelle Guild, president of Lurelle Guild Assoc., told his audience that styling of film materials would not be a gamble if 1) sellers ceased to accent price at the expense of quality; 2) manufacturers understood the distribution of their merchandise; and 3) coloring was to be done more intelligently.

Calendered Film

Generally speaking, the minimum investment for a plastics calendering unit, including auxiliary equipment, will run to approximately $200,000 installed, according to N. J. Elder, manager, Calender Div., Adamson United Co., in his paper, "Calendered Film." Large installations, incorporating a 32-in. or 36-in. calender for high speed production, would run as high as $850,000. Present day calendering equipment is capable of producing thin film at speeds of 60 to 100 yd. per min.; five or six years ago speeds were only 20 to 30 yd. per minute. It is contemplated that future calenders may well be designed for 200 yd. per minute. Designing calenders for higher speed is a relatively simple

(*Continued on page* 179)

Paper Plates That Take a Beating

Melamine-impregnated sulfite paper blanks are compression molded to produce plates with a hard, impervious surface. One type of plate is used for baking pies

Soggy, limp paper plates at parties and picnics will be a thing of the past when these new plastic-impregnated plates are used. They are made in a wide range of colors

GREASEPROOF and heat-resistant paper plates which can even be washed and reused if desired are now being made by impregnating sulfite paper with melamine resin blend and then compression molding it into plates in metal molds. This method of production is now being used to make Calcedon picnic plates, compartmented mess trays, and pie plates. The plates, which are economical enough to be disposable after one use, are made by Remco Food Products, Inc., New York, N.Y.

The company is now producing a 10-in. dinner plate, a 9¾-in. compartmented plate, and an 8-in. pie plate for the civilian market and is producing compartmented mess trays under a development contract with the Army Quartermaster Corps.

Heat resistance of the plates depends upon the formulation of the impregnant used and the degree of impregnation. The mess trays, which are more definitely designed as throw-aways, will take up to 300° F. The civilian plates, which are more likely to be reused, will take up to 450° F. The pie plates, which are full when subjected to heat, will take up to 800° F. because the food absorbs much of the heat.

The pie plates are less expensive than the throw-away type aluminum foil plates now being used by commercial bakeries. In addition, they require no greasing and will not stick to the pastry.

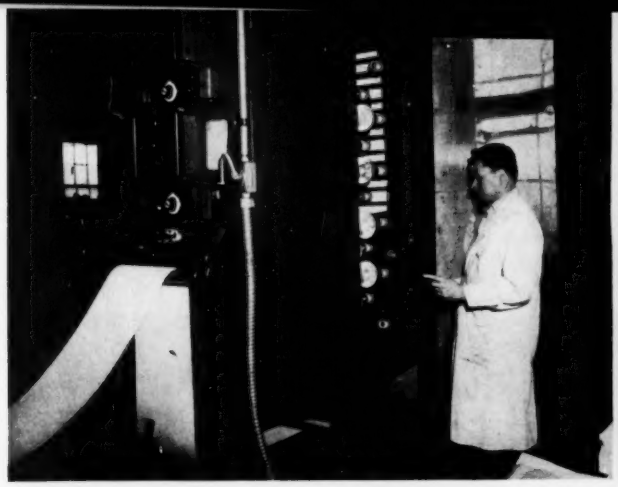
The dinner plate and compartmented plate are made in attractive colors which are achieved by adding vegetable dyes to the impregnating resin blend. White paper is used, but the plates are currently being produced in bronze, yellow, green, and blue. Because of the impregnating process used, the manufacturer claims that the plates are far more greaseproof than plastic coated paper plates. Ordinary paper plates, of course, are not even comparable.

First step in the production of the plates is to pass a continuous web of white sulfite paper through the impregnating bath. The exact composition of the impregnant is a company secret, as is the percentage of resin in the impregnant. All that the company will say is that the impregnant contains an unrevealed percentage of Monsanto's Resimene and that the finished plates contain less than 1% melamine resin.

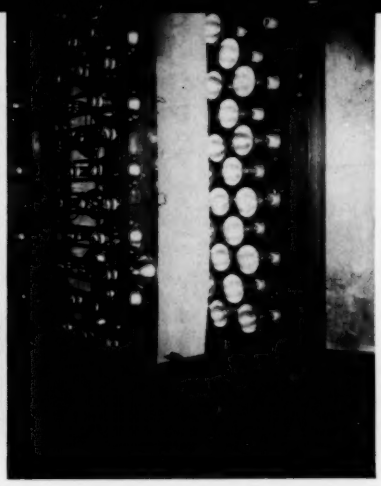
Speed of the paper web through the resin bath is 3800 ft. per hour. It then passes through squeeze rolls which force the impregnant into the paper. These rolls are just below an infra-red drying oven. The web passes upward through this oven.

The impregnated paper is then blanked into squares. The paper used is 0.0075 in. thick, and two blanks are used to make each plate. During molding, the two blanks are pressed down to a combined thickness of 0.012 inch.

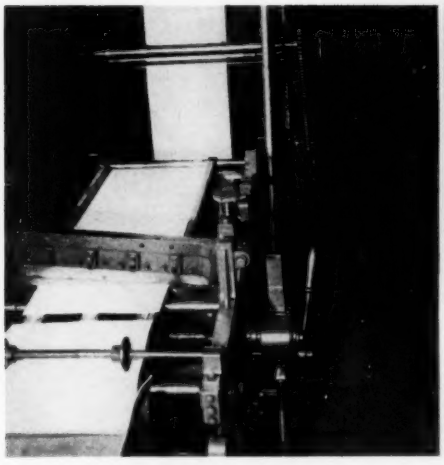
The lay-up of two square blanks is loaded into a cast, hand-finished chrome plated metal mold and molded for 15 sec. at 330° F. under 4000 p.s.i. pressure. The molding is done in a set-up of four compression presses operated by one man seated in a swivel chair in the center of a circle formed by the four presses and four racks for blanks and finished plates. The waste is trimmed after molding.



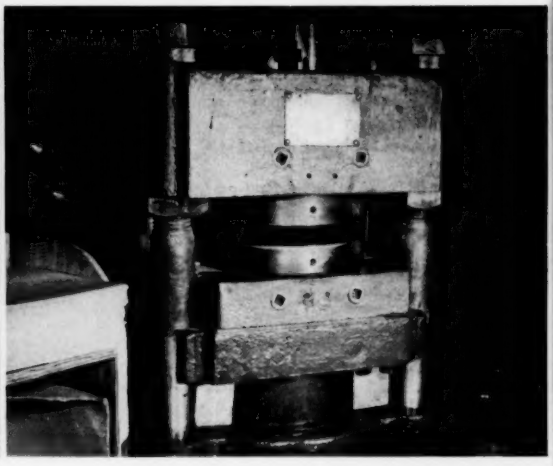
First step in production of new plastic-paper plates is impregnation of the paper. Web from roll is fed through rollers (left) and through resin blend tank under oven cabinet



Impregnated paper web passes through squeeze rolls at bottom of cabinet, then between banks of lamps

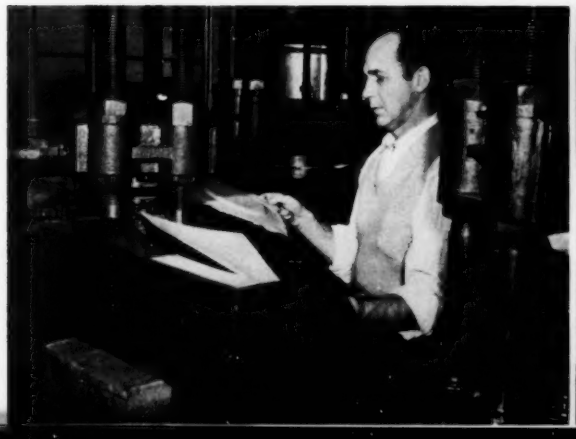


After the resin impregnant has been cured by heat from the infra-red lamps, the paper is cut into squares for molding



Matched metal dies used for compression molding the impregnated paper into plates are cast, hand finished, then chrome plated to insure long life

In molding the plates, the operator, seated in a revolving chair, takes care of four presses, consecutively feeding in blanks and removing the molded plates



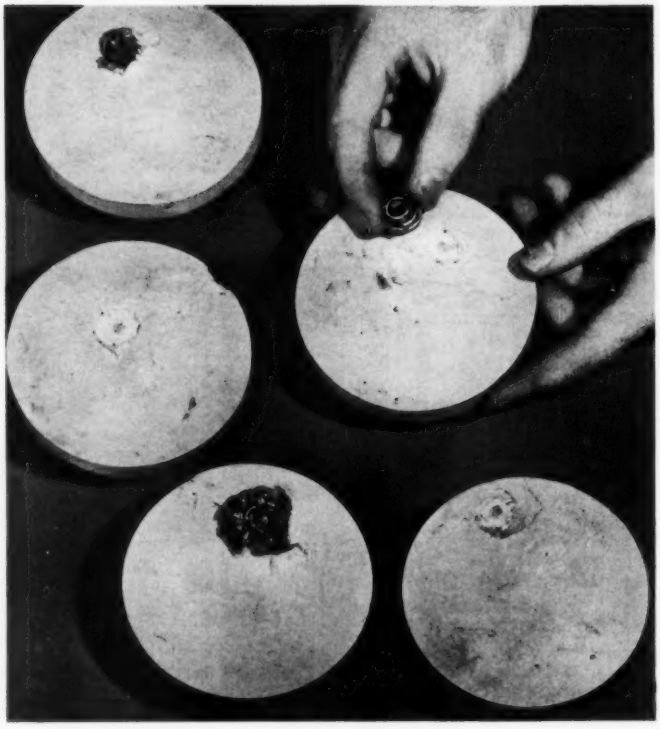
Plates fall through center of trimming machine to shelf; waste piles up on cutter, is periodically removed

An Alkyd With Muscles

A molding material long recognized for its excellent electrical properties now gains strength by the addition of fibrous glass

ALKYD resin and Fiberglas reinforcement have been combined to produce a new molding compound which has higher impact strength than any other plastic molding material. The new compound, which can be compression or transfer molded, was recently announced by the Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio.

Plaskon Alkyd 440, as the new material is called, is supplied to molders as a complete mixture of resins and irregular pieces of matted glass fibers. It can be molded into pieces which have extreme dimensional stability, good electrical properties, and high heat distortion temperature as well as exceptionally high impact strength. Plaskon Alkyd 442, which has particularly good flame resistance, is another version of the material.



Slugs fired from a .45 cal. Colt automatic flattened upon impact with disks molded of new reinforced alkyd compound. The plastic chipped but the test disks remained intact

Molding Procedures

Because the new material depends upon the glass fibers for its high strength, the final alignment of these fibers should be in the direction of maximum stress in the finished part. Since the fibers tend to orient themselves in the direction of flow of the material during molding, excessive flow must be avoided to achieve maximum strength.

Because of the abrasiveness of the material, molds should be made of hardened chrome-plated steel. Because of the high bulk factor of the material (6 to 9), ample loading space must be provided when preforms are not used.

The material requires a fast closing press. It is generally recommended that the press be closed in four to six seconds after charging the mold. The molding temperatures can be varied from 275 to 330° F., but 290 to 310° F. is the preferable range. Lower temperatures will tend somewhat to offset the handicap of a slow closing press, but will also increase the tendency of the piece to stick in the mold due to incomplete cure.

The recommended molding pressures are between 1500 and 2000 p.s.i. When such pressures appear to be insufficient to fill out the piece, it is usually because there is not enough relief provided in the plug portion of the mold.

When molding alkyd 440 in molds in which phenolic materials have been previously used, it is recommended that the mold be thoroughly purged by running urea formaldehyde prior to running the alkyd. Liberal applications of zinc stearate should also be used on the first two or three alkyd moldings.

Although pieces with excellent appearance can be produced by transfer molding, experience shows that the transfer molded pieces differ from compression molded pieces in physical properties. The surface appearance and arc resistance are considerably improved, but the impact strength is considerably reduced and the flexural strength is somewhat poorer. The design of the transfer pot, runners, and cavities governs these changes in properties.

When transfer molding alkyd 440,

it is usually advantageous to preheat the material for 10 or 15 minutes at 160 to 170° F. After preheating, the material is usually compressed by hand or in a preform die before insertion into the transfer pot. The pressures used on the plunger must be moderately higher than those necessary for phenolics. Transfer times may vary from 3 to 10 seconds. Longer transfer times are apt to cause trouble by setting up the resin in the transfer pot. The mold temperatures are the same as those recommended for compression molding the material.

Properties of the Material

Because the material is so new, all the desired information on physical and electrical properties has not been accumulated. The problem of gathering the data is complicated because the unusual properties of the material make the results of some conventional test methods doubtful. Moreover, many of the characteristics depend on the molding techniques used in the production of the piece.

Electrical properties—Compression molded alkyd 440 has a dielectric constant of 5.2 to 6.0 at 60 cycles and a dissipation factor of 0.023 to 0.024. The results of arc resistance tests are erratic. The ASTM method varies from 15 to over 180 seconds, while other types of tests have shown up well. Thus, the suitability of the material for applications requiring arc resistance must be determined by actual evaluation of the part in question.

Physical properties—The material will withstand temperatures of 300° F. for long periods, 350° F. for limited periods, and 400° F. for short periods. The coefficient of thermal expansion is 10×10^{-6} to 30×10^{-6} in./in./° F.

Alkyd 440 is not self-extinguishing and cannot receive Underwriters or Naval Ordnance approval. However, alkyd 442 can be used when a self-extinguishing material is required. This compound has substantially the same properties (other than flammability) as type 440.

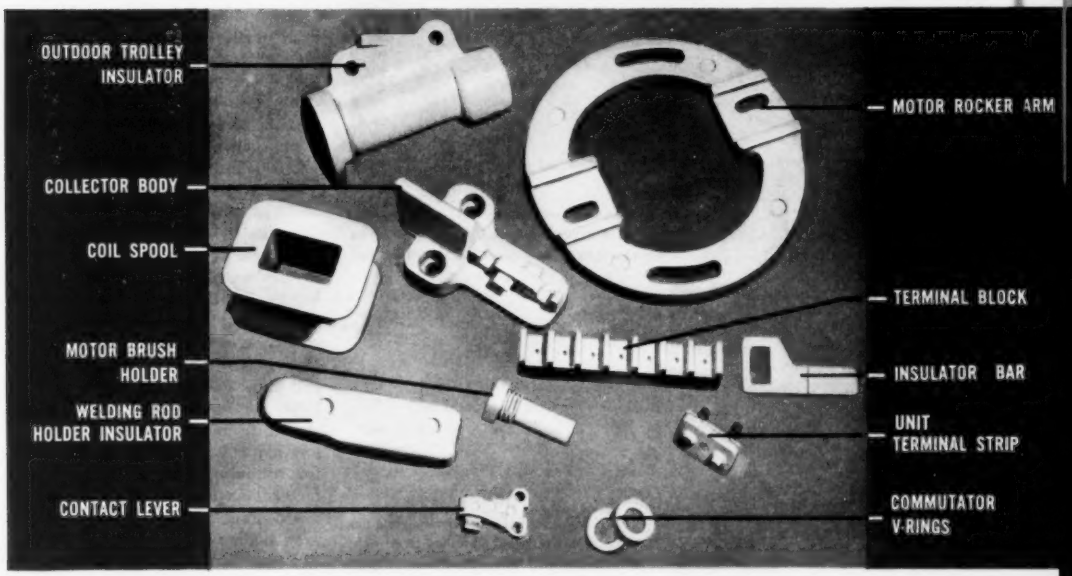
Mechanical properties—Izod impact values usually range from 12 to 24 ft. lb. per in. of notch. Conventional testing methods indicate average flexural strength values of 14,000 to 17,000 p.s.i. But a great deal of residual strength is present in the material after the initial cracking because of the presence of the reinforcing glass fibers.

Caster wheel, box, machine gun handle molded of new high impact material

The material is machinable only with difficulty. It is so abrasive that ordinary steel tools quickly lose their cutting edges. Carboloy tools or bonded abrasive wheels are recommended for machining.

Chemical properties—Alkyd 440 is resistant to hydrocarbons, other neutral organic solvents, and mild acids. It is not recommended for applications involving continuous contact with water or exposure to steam or boiling water.

Typical uses of glass-filled alkyd for the electrical industry. In addition to its good electrical properties, the new material has extreme dimensional stability, high heat distortion point, and excellent impact strength. One type is also self-extinguishing



Styrene Molds for Chocolate

In making of hollow figures, heated chocolate, poured into relatively cold transparent styrene mold, is partially cured on contact and a thin skin of the material is set

Photos courtesy Niagara Plastic Molds, Inc.

Operator pours out the excess material from mold, leaving only the hollow thin-walled chocolate; figure is chilled for final cure

Interchangeable halves of styrene mold are taken apart to remove finished item; tight fit possible with mold minimizes the flash

INJECTION molded transparent styrene molds are now being used instead of metal molds in the production of chocolate or ice cream Easter bunnies, turkeys, Santas, and other seasonal items. The new type molds, made by Niagara Plastic Molds, Inc., Buffalo, N.Y., offer many advantages over metal molds and cost less than half as much.

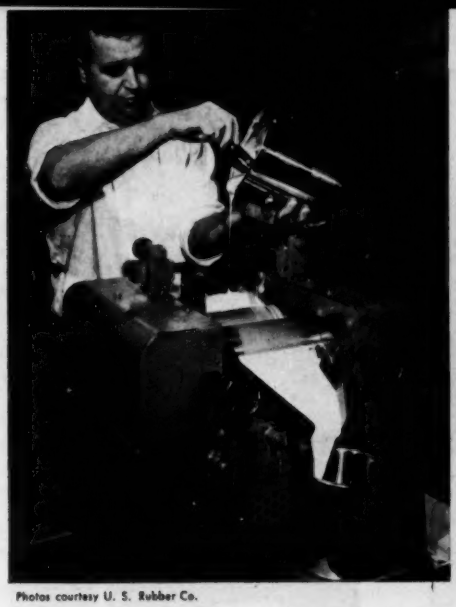
Hollow chocolate figures are produced by a process similar to that used to slush mold hollow plastic objects. The heated material is poured into a relatively cold mold. Contact with the mold partially cures or sets a thin skin of the chocolate and the excess is then poured out of the mold before the thin-walled hollow figure is chilled to give it a final cure or set. Solid items are made in the same molds by eliminating the pouring-out step.

The two-part molds are usually made of formed sheet metal, and the radius at the parting line results in a rather heavy rib on the finished chocolate piece. A much more accurate precision fit is possible with the styrene molds, which are molded for Niagara Plastic Molds by Hake Mfg. Co., Inc., Depew, N.Y. Because of the tolerances which can be held in injection molding, the two halves of the mold fit together tightly, thus minimizing flash during the molding operation. Furthermore, the various halves of the same type mold are interchangeable and replaceable. Special clips of high impact styrene clamp the two halves of a mold together.

The transparency of the styrene molds allows the molder to see when all air bubbles are out of the chocolate, eliminating holes in end product and giving smoother finish.

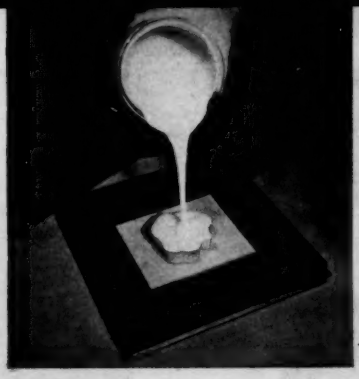
Another advantage of the styrene molds over the metal molds is their light weight. They weigh only about one third as much as metal molds. This makes them easier to handle and steps up production.

The styrene molds can also be stored from year to year without any danger of rusting or necessity for retinning. This is an important factor because the chocolate items are seasonal. Niagara plastic molds are available for various Easter, Thanksgiving, and Christmas figures.

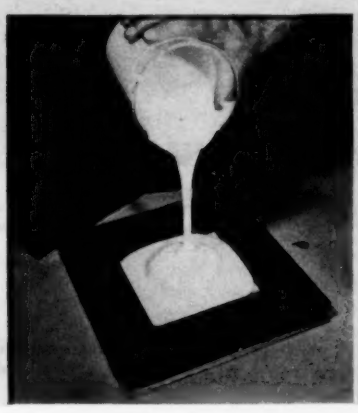


Photos courtesy U. S. Rubber Co.

Dispersion of vinyl, plasticizer, stabilizers, and foaming agent is obtained on a mill. In some cases, simple stirring is sufficient



Compounded material for molding expanded vinyl item is poured into metal mold in steel frame



Material to be foamed fills not only sheet metal mold but entire cavity of steel frame, equalizing pressure on mold

New Vinyl Foaming Agent

Details and proportions of the mold are retained when product expands after molding

A NEW nitrogen foaming agent has proved particularly efficient when used for producing expanded polyvinyl chloride compounds. This new agent, which is a product of Naugatuck Chemical, Div. of U.S. Rubber Co., Naugatuck, Conn., is known as Celogen.

The producer states that Celogen has definite advantages over certain other nitrogen foaming agents: its decomposition is less exothermic, and hence, easier to control; the by-product formed is a relatively inert, odorless polymer which does not catalyze breakdown of the vinyl; light colored sponge with better dimensional stability can now be produced by its use.

In the molding process, the material activates under heat and pressure. When the molded product is removed from the mold, it expands to its final size. Since Celogen disperses readily in vinyl compounds, the expanded product accurately retains the proportions and details of the original mold.

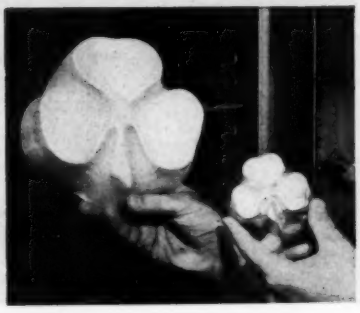
Stabilizers and plasticizers can be changed in both type and amount to produce different degrees of expansion and hence expanded materials of differing densities and consistencies. In all cases the resultant vinyl sponge is unicellular, and hence, is useful in applications requiring high resiliency or permanent buoyancy, as in flotation uses. Another particularly outstanding characteristic of vinyl sponge is that it is much less flammable than the unexpanded compound.

Laboratory work with Celogen expanded material at Naugatuck Chemical has shown that a heavy steel framework with steel top and bottom plates clamped in place over soft aluminum plates, which act as gaskets to form an airtight seal, can be used to produce blocks of sponge. If a complicated shape is wanted, it

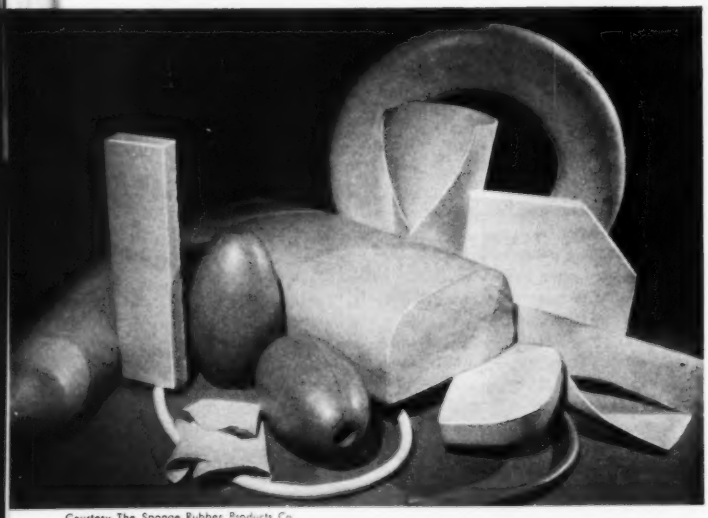
Photos courtesy U. S. Rubber Co.

Removing aluminum plate from steel frame after fusing, blowing, cooling in the press. Material is beginning to expand as plate is lifted

Block of fused material is removed from the steel frame and the object removed from sheet metal mold



Final molded object has expanded 9 to 10 times the volume of the mold, yet accurately retains proportions and details



Courtesy The Sponge Rubber Products Co.

Expanded polyvinyl chloride is available in a variety of molded forms, including sheets, slabs, and cord. In addition, the foamed material ranges from soft to rigid

is not necessary to produce a strong steel mold. A thin sheet metal shell formed to the shape of the desired part can be inserted in the steel frame and the shell and the space around it filled with the properly mixed, unexpanded vinyl material. Thus, with the steel and aluminum plates in place and the whole assembly held under pressure, either on a standard compression press or with sturdy clamps, no pressure is exerted on the sheet metal form, since the pressure inside and outside the form will be equal at all times.

Preparing the Stock

Compositions for molding expanded vinyl objects may be prepared by simply stirring the components together or grinding them on a paint mill. If the formulation does not form a paste readily, the stock may be prepared on a hot roll mill with stock temperatures kept below 290° F., which is the temperature at

which Celogen becomes active in vinyl compositions.

The following soft sponge formulation* of vinyl, plasticizer, stabilizers, and Celogen will give up to a 900% blow with a resulting density of about 8 lb. per cu. ft.:

Marvinol VR-10 or VR-20	100	parts
Tricresyl phosphate	130	"
Stabilizer DS-207	2.5	"
Stabilizer ST-100	2	"
Celogen	30	"

A hard sponge composition, which will give about a 600% blow with a resultant density of 11 to 12 lb. per. cu. ft., may be prepared with the following formulation:

Marvinol VR-10 or VR-20	100	parts
Diphenyl phthalate	70	"
Stabelan E	2.5	"
Ferro 100	2.5	"
Calcium stearate	2	"
Celogen	20	"

Molding Cycles

A typical cycle when using a 1 in. thick mold frame is as follows: 250 to 270° F. for 35 to 45 min., followed by 5 to 10 min. at 290 to 310° F. and no high temperature step, depending on the formulation. With higher stabilizer concentrates than shown in the previous two formulations, shorter cures at higher temperatures may be employed. For a ½-in. thick mold frame, the same temperatures are employed, but the times are reduced to approximately one-half.

Following the fusing and blowing steps, the mold, still held under pressure, should be cooled rapidly. The center of the plastic should be well below 200° F. before the pressure is removed from the mold. The piece will partially expand as it is removed from the mold. It is then brought to maximum volume by heating for about 1 hr. in an oven at a temperature of 212 to 220° F., or in boiling water. The part should then be annealed in order to obtain maximum dimensional stability. This may be done by holding the sponge at a temperature of 130 to 150° F. for several hours.

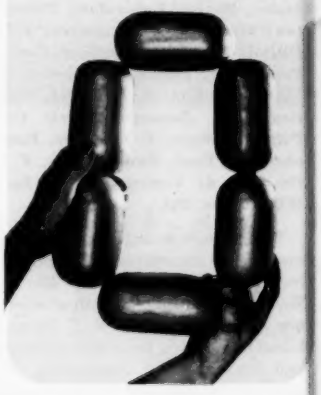
The sponge vinyl products illustrated in the accompanying article are being produced, or will shortly be produced, with Celogen as the foaming agent.

* Suppliers of the materials used in the formulations are as follows: Marvinol VR-10, Marvinol VR-20 and Celogen, Naugatuck Chemical, Div. of U. S. Rubber Co., Naugatuck, Conn.; tricresyl phosphate, Monsanto Chemical Company, New York, N. Y., and Ohio-Apex, Inc., Nitro, W. Va.; diphenyl phthalate, Monsanto Chemical Co.; stabilizer DS-207, National Lead Co., New York, N. Y.; stabilizer ST-100, Firestone Plastics Co., Pottstown, Pa.; Stabelan E, Stabelan Chemical Co., Toledo, Ohio; Ferro 100, Ferro Chemical Corp., Bedford, Ohio.

Photos courtesy The Sponge Rubber Products Co.

A sponge vinyl life ring is now undergoing experiments by the U.S. Navy

Floats for commercial fishing nets are being molded of expanded vinyl



Cellular sponge vinyl brings new safety to the boxing ring. A ring mat made of this material will reduce the chances of serious head injuries when a man hits the mat

Courtesy U. S. Rubber Co.

Another flotation use for the expanded vinyl is for molded life raft frames

S. P. E. Technical Conference

Abstracts of the papers presented at the Eighth Annual National Technical Conference held in Chicago

THEME of the conference held January 16 to 18 was "Plastics Horizons." Abstracts of the papers presented and, as far as possible, of the panel discussions, are presented below.

What Should Plastics Engineers Know?

Moderator — Dr. Louis F. Rahm, Director, Plastics Laboratory, Princeton University. Panel members: J. H. DuBois, Plax Corp., Hartford, Conn.; Prof. J. W. Lindau, University of South Carolina; R. A. Hoffer, Plastics Dept., General Electric Co., Pittsfield, Mass.; E. S. Bloom, Polychemicals Dept., Research Div., E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.

This panel was set up to represent and discuss the interests of engineering education and industry. Mr. Du Bois and Prof. Lindau, both of whom are members of the S. P. E. Educational Committee, reviewed problems and limitations of engineering instruction in the field of plastic materials and phases of the educational program endorsed by the Society in 1949. Mr. Hoffer and Mr. Bloom presented the point of view of industry as to what should be expected from the plastics engineer in the matter of specific training.

Mr. DuBois: Since mathematics is the basis for all cost studies, this useful tool is of fundamental importance, mensuration and trigonometry being minimum essentials. Strength of materials, mechanics, and thermodynamics are very useful mathematical tools. A good working knowledge of drafting is another basic essential. Facile use of the written and spoken word are most valuable. A broad understanding of all plastics materials is a basic requirement, including all properties, good or bad, under varying conditions of use. This should cover basic testing procedures ASTM D-20 and D-9and means of using the published properties resulting from these tests.

Full understanding and use of these data require the fundamentals of physics, chemistry, and electrical circuits. Fundamentals of tool making methods, materials, and time requirements are needed as a background to economical tool and product design. Equally desirable is an understanding of conventional general manufacturing processes, and particularly competitive processes. All plastics material making processes and material fabricating processes are basic requirements since it is very important to be able to evaluate your position within the industry.

Pre-plasticizers

R. W. Powell, Hydraulic Press Mfg. Co., North Gilead, Ohio

Various phases in the development of H.P.M.'s new line of pre-plasticizing injection molding machines were discussed. It was shown how the machines work as well as what they can do, and samples of various molded parts were displayed. The effect of pre-plasticizing on future machine design was also discussed.

Stress Gremlins in Thermosetting Plastics

H. M. Quackenbos, Jr., Bakelite Co., New York, N. Y.

Phenolic molding of today may be exposed to a wide variety of conditions in service. These conditions are often too complex to be analyzed in terms of the older physical tests — of tensile strength, flexural strength, Izod impact strength, and water absorption in 24 hours. If such tests alone are considered, many of the failures that occur in service are unaccountable, or are caused by "gremlins."

Much new test information has been gathered in the past ten years, relating to notch sensitivity, long-time loading, water absorption, and residual or inherent stresses. Combining the old and the new information, we can explain mysterious failures and, better, can design in advance so that they will not occur.

Mold Design

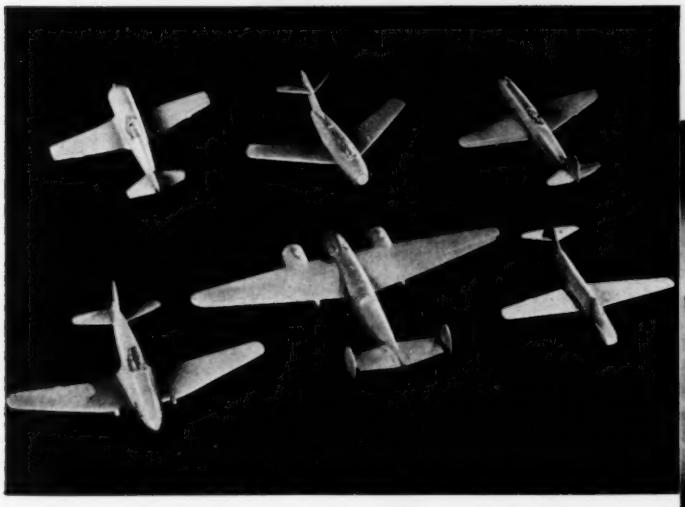
Moderator — Carl F. Massopust, Plastics Div., General American Transportation Corp., Chicago. Panel members: Wayne I. Pribble, Barrier-Pribble Co., Inc., Ft. Wayne, Ind.; Victor G. Reiling, Kurz-Kasch, Inc., Dayton, Ohio; Edward F. Borro, Durez Plastics & Chemicals, N. Tonawanda, N. Y.; W. P. Gobeille, Nash-Kelvinator Corp., Milwaukee; Wilfred G. Harvey, Guy Harvey & Sons, Leominster, Mass.

Mr. Massopust: Aside from the individual molder's ability to evaluate the capabilities of a tool and die shop, the quality of the finished mold rests almost entirely with the mold designer. Beyond the actual drafting and detail layout of the design, mold design becomes a group effort involving the mold designer, production engineer, and sales engineer. The unnamed member of the mold design group is the customer or end user, represented by the sales engineer. In the organization of this panel we have a similar group set-up.

Mr. Borro: Prior to the introduction of phenolics in 1909, most of the available materials were molded at comparatively low pressures, and molds did not have to be substantially built. Present day production, highly mechanized, is based on good engineering, requiring a study of molding technique, plastic materials, metallurgy, heat treatment, mechanics, and tool design. Differences in mold design, molding pressure, preheating material, gate sizes, and material will make considerable difference in physical properties of the molded part as well as economy of production.

Mr. Harvey: When large quanti-

(*Continued on p.* 184)



Scale models of Russian planes, as made for use in aircraft recognition program. Top row, left to right: LA-11, MIG-15, and YaK-15. Bottom row: IL-10, TU-2 and MIG-9

Blue cellulose acetate is used to mold the models of U.S. Navy planes shown below. Upper left: AJ1. Right center: F3D. Left center: F9F. Bottom: F2H

Model Planes for Recognition

INJECTION molded scale model airplanes play a large part in an aircraft recognition program which is one of the many educational projects of the Special Devices Center of the U.S. Navy, at Sands Point, N.Y. This Center originates, develops, and procures training aids for any Army or Navy training activities which require them. These aids range in scope from simple affairs which visually illustrate Boyle's Law to complex mechanisms which not only explain the operation and maintenance of electronic gun aiming equipment, but can also be used to train gunners for actual combat.

The aircraft recognition program began during World War II. Its purpose is to familiarize students with the appearance of planes of various nations and hence requires accurate and detailed reproductions which can be produced in large quantities when required.

Since the inception of the program, literally hundreds of different scale model planes have been injection molded of Tenite I, and a great number of them have been produced by Cruver Mfg. Co., Chicago, Ill.

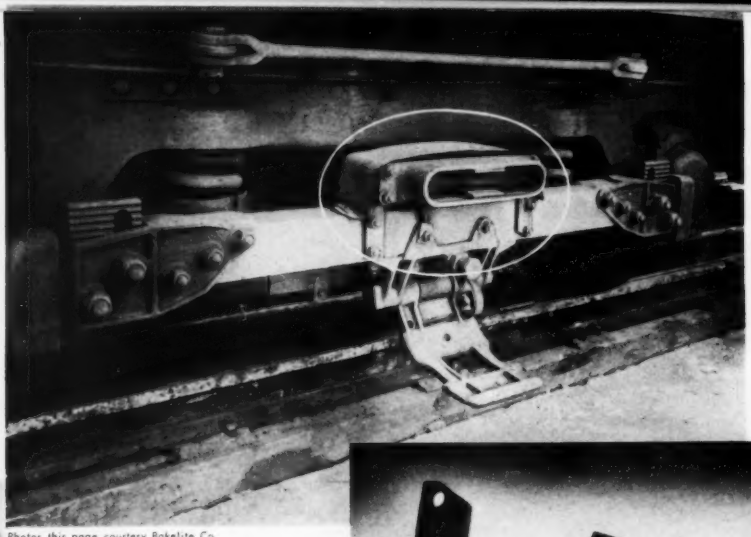
James W. Barry, of Special Devices Center, has been associated with this recognition program since it began. He is responsible for the present program which has been set up so that all the model production work is done on a custom basis. The Government procures the original wood models, produced to exact scale, then furnishes these models to the contractor who engineers and is responsible for the manufacture of Government-owned molds. These molds must be accurately manufactured to duplicate the wood model.

The wooden models for the group of planes illustrated here were made by Wood Work Specialties Co., Chicago, Ill. In the larger planes the scale is 1 to 144; in the small planes, the scale is 1 to 72. Beryllium copper molds were cast, using the wooden models as patterns.

All of the planes illustrated were molded in one piece, with the exception of those which have transparent canopies. Where canopies are used, they are cemented in place as the final step in production.

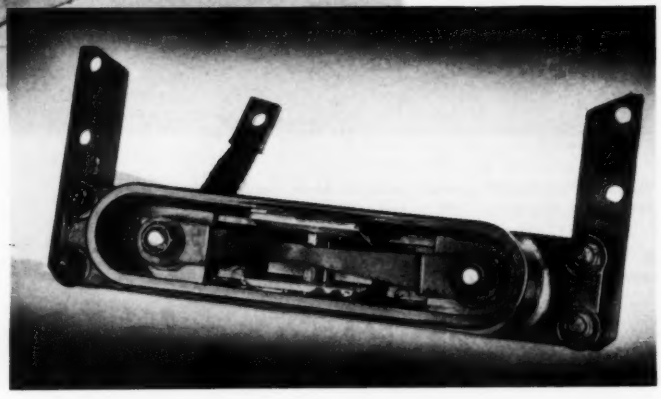
After the model planes have been molded, the gates are machined smooth and the planes are given a coat of lacquer of the same color as that of the molding material used. This is done in order to eliminate the shine which is inherent in the molded plastic. The reason why color of molding material and paint is matched is to overcome the possibility of a different color being exposed if the lacquer becomes scratched. Two colors are used: gray for all U.S.A.F. and foreign aircraft having aluminum finish; blue for all U.S. Navy planes.

The use of transparent canopies eliminates a solid mass in the canopy area which would interfere with recognition characteristics. The large transparent canopies on high-flying planes become more or less invisible to observers, and it is necessary that the models take this into consideration and present the student with an accurate visualization of the plane as it appears in flight.



Photos this page courtesy Bakelite Co.

Phenolic housing for power fuse of train is mounted on a truck of the car and must be capable of withstanding the constant vibration and the dangers of direct hits by flying stones



Adequate electrical insulation is provided by the phenolic housing surrounding the high-amperage power fuse; the fuse box is attached to the railway car by mounting lugs on each end

Protecting High-Amperage Fuses

Phenolic housing solves electrical and mechanical problems, minimizes maintenance requirements

SUBWAY and other electrically powered rail cars are equipped with fuses in the lines which carry current from the third-rail contact shoes to the controls and motors. These fuses must be suitably housed and the housing must provide adequate electrical insulation for a minimum of 600 volts and up to 600 amperes; it also must resist the action of the arc created when the fuse blows. Because this housing is mounted on a truck of the car, it is subjected to terrific vibration and is a target for flying stones.

For years, Horne & Co., New York, N.Y., made these fuse boxes of wood—and was experiencing too much maintenance trouble. Accordingly, a search was started for another material which would have the required electrical properties, which would stand up under the mechanical stresses, and which could be molded in one piece.

The answer was found in phenolic molding compound, and Boonton Molding Co., Boonton, N.J., was commissioned to mold a newly designed one-piece box approximately 18 in. long by $3\frac{3}{8}$ in. wide. The compound specified for the job consists of chopped canvas and phenolic resin (Bakelite BM 1132), combined with a small amount of high-quality general-purpose phenolic material (Bakelite BM 120). This high-impact material, with suitably heavy wall sections (up to 1 in. at the mounting holes) and molded under carefully controlled molding conditions, has produced highly satisfactory boxes requiring a minimum of maintenance.

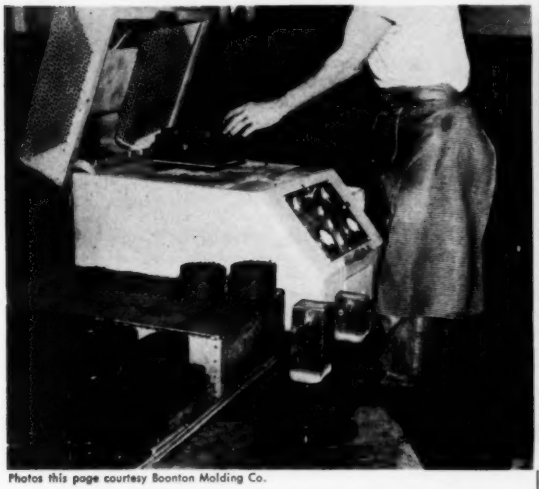
Since the first production of these boxes, they have been installed in the IRT, BMT, and IND subways in New York City; in the subways

in Stockholm, Sweden; on cars of the Staten Island, N.Y., and the Boston rapid transit system—and even on the Long Island Rail Road.

Eight Pills Used

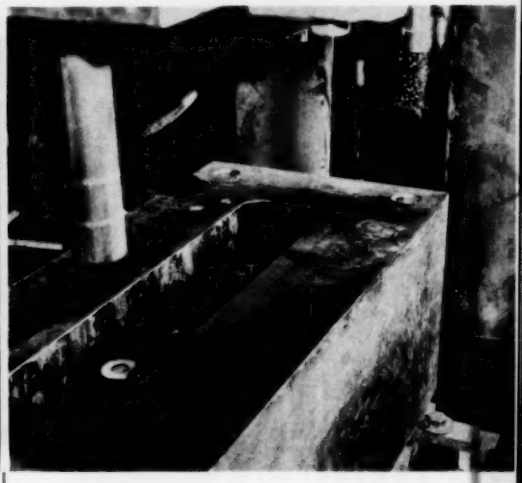
The phenolic boxes, weighing 4 lb. each, are molded base-side-up in a single cavity mold. Four large pills of the high impact and four small pills of the general-purpose material are preheated by high frequency. Even with this precaution, when the job was first started, it was found difficult to fill-out the mold. Many "light" pieces were molded before a unique mold-loading method was evolved. In this method, all eight preforms, in two stacks, are loaded in one end of the cavity. This gives the material a much greater chance to flow than if the preforms were spread uniformly throughout the entire length of the cavity. The piece fills out perfectly now, and with a minimum of flash.

The pills are preheated for 1½ min., and after a 10-min. cure, the part is removed from mold. A minimum of hand filing finishes the piece.

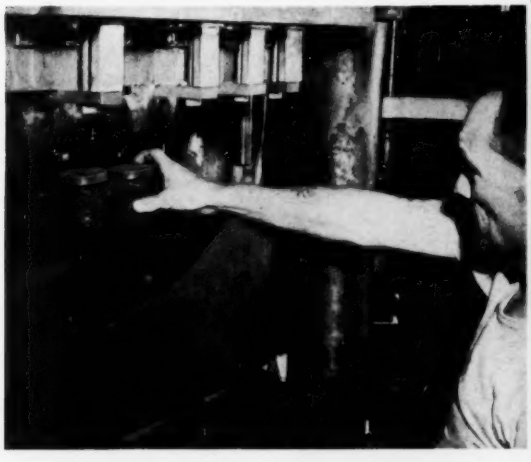


Photos this page courtesy Boonton Molding Co.

Preforms are made of both high-impact and general-purpose phenolic; pills are preheated by high frequency for 1½ min. before being put into mold



Phenolic boxes are molded base-side-up in single cavity mold; a large number of knock-out pins is required for removal of box



Eight preforms—four of each grade of phenolic—are loaded in one side of the cavity to give material a better chance to flow and fill out the piece

After 10-min. cure, the 4-lb. box is ejected from the mold. Only a minimum of hand filing and piercing is needed for finishing

Striking applique design on 20-gage vinyl wallets and slackie bags is achieved by heat sealing die-cut pieces of vinyl in contrasting colors to the outside of the wallet or bag. Veins of leaves or petals of flowers in designs are achieved by pattern of the die. Wallets and bags are made in 36 color combinations by Ro-An Sales Co., 37 West 39 St., New York, N.Y.

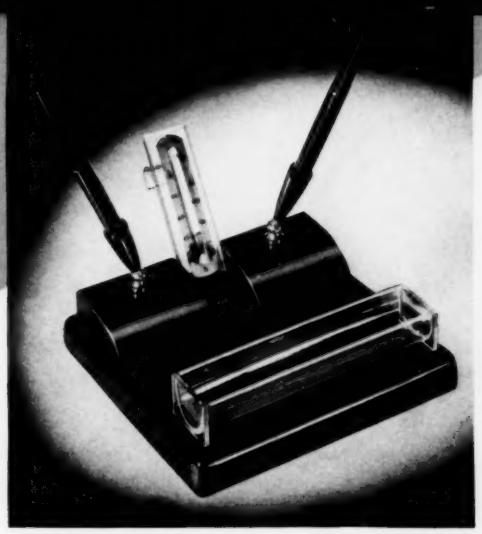
Visor for car door window is molded of Tenite II cellulose acetate butyrate. It can easily be clipped on to make it possible to keep window open even in driving rain or snow. The transparent colored material also protects the eyes from glaring lights from the side. Made in sizes to fit 2-door or 4-door sedans, in colors to match popular car colors, by Tenna-Lite Corp., 312 West Illinois St., Chicago, Ill.

PLASTICS PRODUCTS

Light switch plate for a child's room has colorful clown face; bulbous red nose serves as the switch button. The colorful plate, molded of Tenite I cellulose acetate, provides a cheerful decorative touch and protects the wall from finger smudges. It can be used in place of the regular switch plate over any toggle type switch. It is called Flicko and is manufactured by Falcon Plastic Products Mfg. Co., 6020 West Washington Blvd., Culver City, Calif.

Ornaments molded of Lustrex styrene and decorated in two or three colors give a splash of color and a dash of added interest to potted plants. Pointed stakes molded as part of each piece can be pressed into the soil to hold the ornament firmly in place. Ornaments available include flamingo, owl, parakeet, Sunbonnet Sue, and trellis with bird perched on it. They are manufactured by Art Plastics Co., 511 Lancaster St., Leominster, Mass.

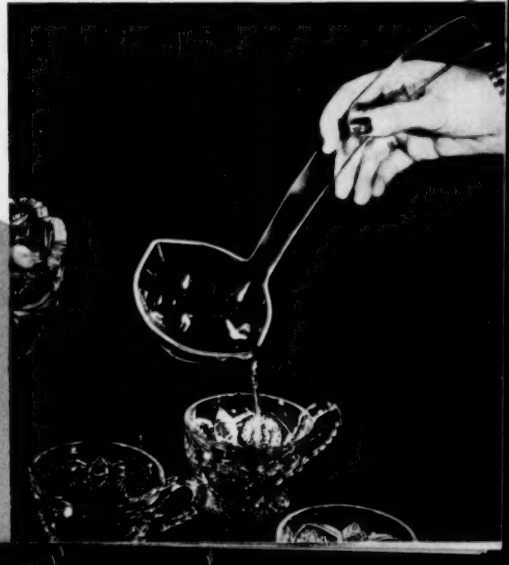
Hammock made of plaid Lumite saran fabric is supported on specially designed wooden frame with legs to prevent it from tipping and tension adjusters so that the user can have a tight or loose-hanging hammock, as he prefers. The hammock disassembles easily for shipment or storage. Made by Houtz & Barwick, Elizabeth City, N. C.



Desk stand complete with pens, thermometer, clip for memos, and tray is made of phenolic, acetate, and acrylic. Pen mounts and base of set are molded of black Durez phenolic. Pens and their funnels are black acetate. Paper clip tray and thermometer backing are clear acrylic. Made by Appreciation Advertising Assoc., 9 North Tyler Ave., Hopkins, Minn.

Gloves can be kept securely attached to purse with attractive Glove Grip molded of Ampacet cellulose acetate. The jet black or tortoise shell grip is studded with rhinestones. It works without springs or chains. Molded by Hardy Plastics & Chemical Corp., 1 Junius St., Brooklyn, N.Y., and marketed by David D. Leavy & Co., Inc., 366 Fifth Ave., New York, N.Y.

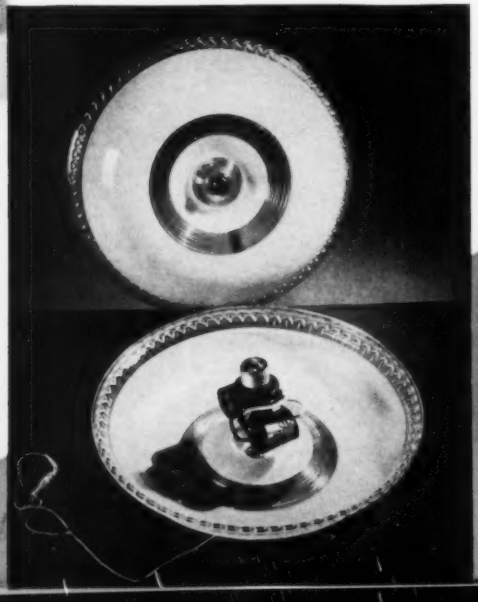
Ladle molded of high impact Lustrex styrene is chip-proof and eliminates the possibility of glass chips in the punch when the ladle strikes the bowl. The curved handle and pouring spouts molded-in to sides of ladle make it easy to use. Molded in clear or transparent red by Superior Plastics, Inc., 410-430 N. Oakley Blvd., Chicago, Ill.



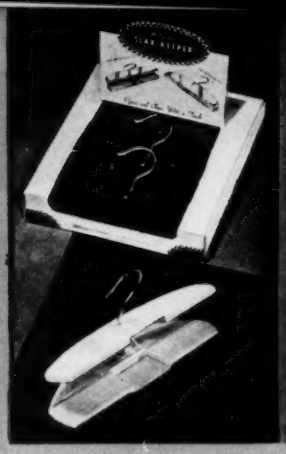
Compact match case-compass-whistle for the sportsman is molded of Tenite II cellulose acetate butyrate. Compass end unscrews to allow access to matches and closes tightly to keep matches protected from moisture. The unit, called the Kumbak, is only 4 in. long and is pocket size. It is molded by Juno Tool Corp., 2601 East Franklin Ave., Minneapolis, Minn., for Kumbak Co., 808 Nicollet Ave., Minneapolis, Minn.

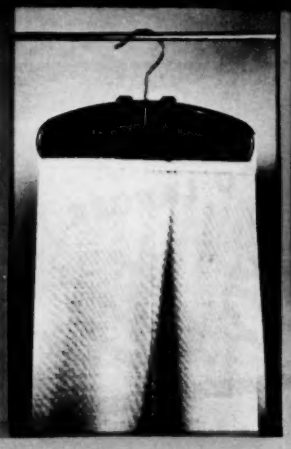
Poker chip set consists of an individual chip rack, an ash tray, a coaster, and 25 chips for each of four players. The racks with built-in ash trays are molded of phenolic. The coasters are acetate, and the chips are urea. The racks nest for storage and are held together by a metal clamp which also serves as a carrying handle. Made by Novel-Craft Mfg. Co., 505 Fifth Ave., New York 17, N.Y.

Bare one-bulb ceiling fixture can quickly be converted to an attractive two-light fixture with adapter unit which screws into the bulb socket as simply as a bulb. The unit has two phenolic sockets and a bowl molded of clear styrene and decorated by spraying. Made with or without pull switch, in solid colors or with floral decorations, by Rex Electric Mfg. Corp., 190 Berry St., Brooklyn 11, N.Y.



Hair, face, and shoulders can be kept dry with 4-gage vinyl scarf with built-in visor. The visor, attached to the center of the long side of the triangular scarf, is flexible enough to conform to the shape of the head but rigid enough to stand out and protect the face. The vinyl used is embossed to resemble taffeta. Made in five colors by Plastic Fashions, Inc., 10519 Superior Ave., Cleveland, Ohio.





Pants or skirts hang at full length and are kept wrinkle-free in styrene hanger with steel spring mechanism. A flip of the hook opens or closes the clamp-type hanger. Serrations molded-in to the jaws of the hanger keep the garment from slipping. A center opening in each jaw makes allowance for the extra thickness of trouser seams. Made by Williams Mfg. Co., Inc., 419 E. La Palma Ave., Anaheim, Calif.

Bonbon dish is molded of Lustrex styrene and then metallized to look like silver. Intricate designs such as are found on silver dishes are molded-in. The dish is light in weight and easy to keep clean. Made by Nalle Plastics, Inc., 108-10 W. Second St., Austin, Texas

PLASTICS PRODUCTS

Exterior windshield visor extruded of green Plexiglas acrylic protects driver and front seat passengers from glaring lights. The visor does not darken the interior of the automobile; it is made of transparent material which becomes translucent because it is ribbed on the upper surface. Wings and center strip are chrome plated steel. Acrylic parts are extruded by Sandee Mfg. Co., 5050 West Foster Ave., Chicago, Ill. The visors are manufactured by Snyder Mfg. Co., 2218 West Ontario St., Philadelphia, Pa.

Toy harness racer molded of Tenite I cellulose acetate trots along realistically when wound up. Rubber pieces on each foreleg grip the ground so that the horse does not slip on slick surfaces. Rear legs do not touch the ground. Horse, rider, and sulky are acetate, and reins are made of vinyl. Molded by Perry Plastics, Inc., 561 East 18 St., Erie, Pa., for Wolverine Supply & Mfg. Co., Page & Fonteila Sts., Pittsburgh, Pa.

Repairing Reinforced Plastics

Procedure details for making repairs, with special emphasis on the preservation of the electrical characteristics of radomes

by SAMUEL S. OLEESKY

DESPITE the well-known strength characteristics of reinforced plastics, there are occasions when damage is done and repair work is necessary. Such repairs are of particular importance in the case of items of critical military significance or of relatively high cost. Aircraft structural parts, boats, radomes, etc., fall in these classes.

In approaching the problems of repairs to reinforced plastics, preservation of the initial requirements of the structure must always be kept in mind. Thus, in the case of boats or aircraft elements, physical strength is usually the prime consideration; in radomes, on the other hand, electronic characteristics are as important as aerodynamic form and strength. These antenna housings are critical parts of radar systems and hence their repair introduces certain additional problems.

Radomes are most frequently of sandwich construction. The influence of construction—and likewise of repairs—on the function of these items can be appreciated from a study of the curves in Fig. 1. This simple set of design curves gives the relationship between sandwich thickness and incidence angle for a particular frequency of the electromagnetic spectrum. Curve "O" is that which gives the best acceptable wall spacing for each particular angle of ray incidence, based on minimum reflection. Those marked "5%" indicate the thickness which gives a reflection of 5%, etc. While no precise figure can be given for maximum acceptable reflection, it must be borne in mind that reflection of energy back into the radar system will result at least in impaired performance and, at worst, in complete paralysis of the system.

The curves in Fig. 1 are typical radome design curves, covering a specific frequency, with fixed skin thickness, fixed skin dielectric constant, and fixed core dielectric constant. For each change of any or all of these parameters, the curves will be different, but the same general trend may be observed. That is, as the incidence angle increases, the core thickness increases and the tolerance requirements become more exacting.

These curves define a so-called "first-order" radome for the conditions outlined above. Where strength considerations dictate the use of a heavier wall, there are additional sets of curves available which afford the designer a choice of thicker cores, based upon odd multiples of a quarter wave length of the microwave energy. These curves give the designer a range of acceptable radome performance, but it is readily apparent that progressively poorer efficiencies must accompany increased thickness, since dielectric losses in the materials influence the absorption of energy in the radome wall.

The importance, therefore, of accurately maintaining the design thicknesses during repair cannot be over-emphasized.

Damage Categories

For the purpose of instructing Navy classes in repair of radomes, it has been found convenient to divide damage into three general categories: 1) fracture of skin only; 2) fracture of skin with damage to the core; and 3) complete puncture of wall.

Where only a fracture of the skin is involved, several techniques for repair have been developed. One, recommended by Douglas Aircraft Corp., requires the removal of successive layers of skin, in roughly rectangular patches, forming the stepped pattern shown in Fig. 2. These sections are carefully fitted with new material, pressure is ap-

THE AUTHOR

Samuel S. Oleesky

At present chief consultant to Zenith Plastics Co. and Brunswick - Balke - Collender Corp., Mr. Oleesky has long been active in his chosen field. With a strong background in electronics, he was head of the Design Section, Radome Div., Aero Radio-Radar Laboratory, Naval Air Materiel Center in 1946 and 1947, later with Naval Air Development Station in the same capacity, and then head of Radome Section and an electronic scientist with Naval Air Development Center. Mr. Oleesky is author of an original paper on the transmission of microwave energy through dielectric sheets at elevated temperatures and of two basic treatises on radomes and icing. He is a member of the Policy Committee, Reinforced Plastics Div., S.P.I.

* Reg. U. S. Pat. Office

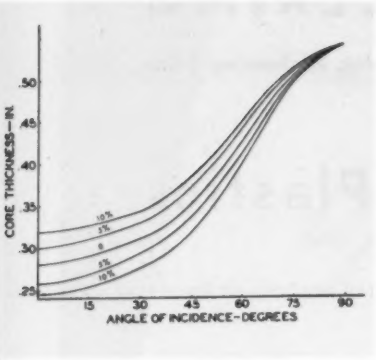


Fig. 1—Curves show importance of core thickness in repair of radomes

plied, and curing accomplished, either by means of room-temperature catalysts or with heat.

While this procedure results in a completely satisfactory patch when properly followed, there is a tendency, if the operator is not meticulous, to score or cut through the under layers of the skin, resulting in a weakening of the wall at these points. Naval personnel have, therefore, been instructed to remove the skin in a roughly circular area around the break. To do this, an abrasive disk on an electric or pneumatic drill is preferred. With careful use, a neatly feathered edge may be produced which lends itself well to bonding with the patch material. The result of such a patch, in exaggerated form, is shown in Fig. 3. After curing, the surface is sanded down by hand to smooth off the ridge formed by excess material. It will be seen that this procedure results in a wall thickness practically identical with the original. Strength will normally be at least 75% of original.

In these procedures, every effort should be made to apply uniform pressure to the patched area during cure. If a relatively sharp radius of curvature exists in the patch section, this pressure may be exerted by stretching cellophane over the area and taping it in place with cellulose tape. If the section is flat, hot sandbags may be laid over the cellophane, or a sponge rubber or felt caul applied, weights placed thereon, and heat applied from the opposite side of the wall. An ingenious worker will find a number of ways by which the necessary pressure may be obtained.

Thickness is Critical

Where the damage to the radome wall includes crushing or tearing of the honeycomb core material, it will be necessary to replace the destroyed section. Core thickness should be determined either from the original blueprints or by means of a micrometer depth gage. As previously indicated, the thickness of the core is critical and can seriously affect the performance of the enclosed electronic equipment if incorrectly chosen.

With the thickness determined, a section of core material should be sliced to that dimension and cut slightly larger than the damaged area removed. This will require insertion of the new section under lateral pressure, so that a good bond will be obtained with the undamaged core.

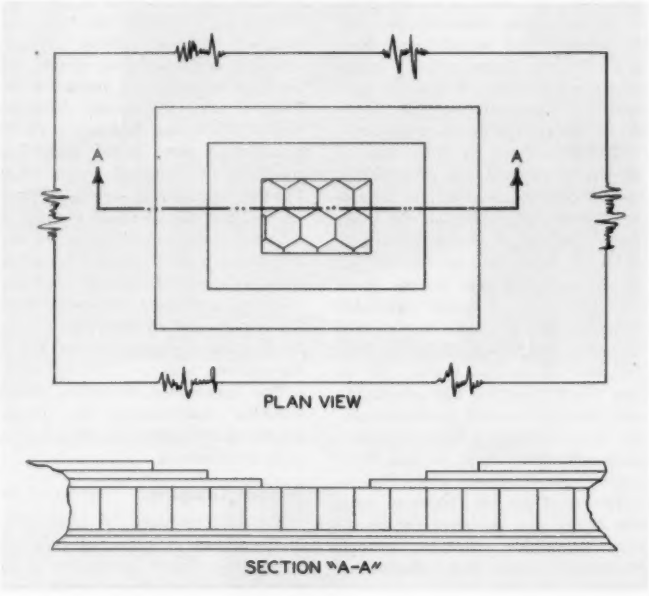
The honeycomb filler material should be prepared for use by dipping it in an acetone-resin solution of about three or four parts acetone to one part resin. After dipping, the honeycomb should be placed on a rack or wire grid to permit evaporation of the acetone. This procedure will leave a very thin coating of resin on the core, making it possible to insure a good bond with the skins, yet avoiding an excess of cast resin in the cells after curing.

Treatment of the skin patch is the same as that previously described.

If the damaged area is relatively large, it will be advantageous to back up the spot with a mold of some sort. Plaster of paris or Hydrocal, found at most repair facilities, are convenient materials. These are mixed in proper proportions with water and poured directly into an area somewhat larger than that to be repaired, after that area has been treated with a parting compound, such as silicone grease. After hardening, the mold may be removed and heat-dried, then replaced and either clamped in position or shored in place with bracing material as shown in Fig. 4. In this manner, the contour of a complex curve may be retained, while sufficient strength is provided to allow the application of pressure to the surface.

It is important that the plaster mold be dried at a temperature

Fig. 2—Douglas Aircraft Co. method of making stepped patch in damaged sandwich skin. Areas where layers of skin have been removed will be fitted with new material



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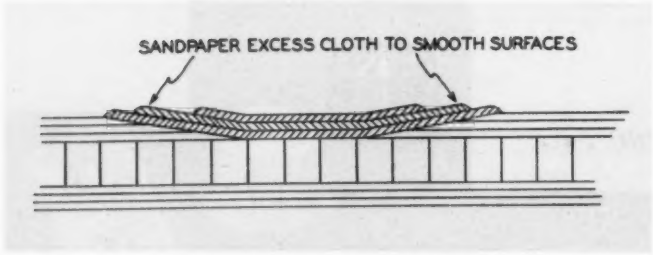

Fig. 3—Method recommended by Navy for making tapered patch by feathering edges of damaged area, placing layers of patching material, curing, and sanding to thickness

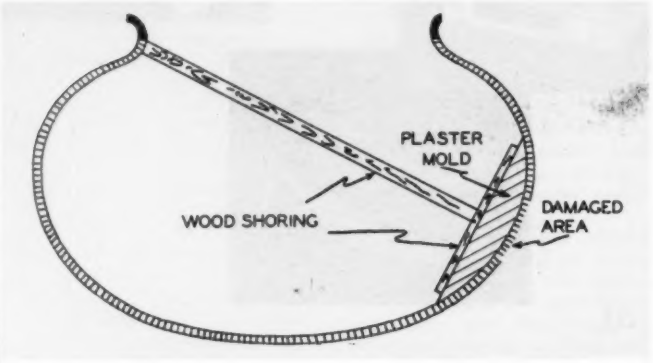

Fig. 4—Large damaged areas often require the use of a mold to back up the spot while applying and curing the patch. Mold may be shored (as shown) or clamped in position

above 212° F., to assure complete removal of the entrapped water. This baking should be followed, preferably while the mold is still hot, with a coating of thinned resin or a special sealing paint, such as Tygon (U.S. Stoneware Co., Akron, Ohio). After the resin has polymerized or the paint has dried, the mold surface should be rubbed with a good release agent, such as silicone grease or hard wax, before the mold is replaced in position.

Complete Ruptures

Where the wall has been completely ruptured, it should be pressed back into its original shape, if possible, prior to repair. Then a mold should be made of the contour, as above. After the damaged material has been removed, the edges of the hole are feathered and the inner skin replaced. If the damaged section is relatively large, it may be necessary to cure the inner skin first, then complete the buildup of the wall in a second operation. However, if only a few square inches are involved, the entire operation may be completed in one wet layup. Figures 5 to 11, inclusive, show such a procedure step by step.

For slicing honeycomb core material, a band saw is most convenient to use. The blade should have about 32 teeth per inch and should be run at about 5000 ft. per minute. Some workers find that reversing the blade, to drag it through the block, gives a "fuzzy" surface helpful in obtaining a good skin-to-core bond. Much higher lineal speed of the blade is required for this procedure.

As many fabricators have discovered, the polyester group of resins exhibit improved physical characteristics when cured at pressures higher than "contact." This has resulted in the adoption of matched metal tooling for many parts formerly made with vacuum bags, with an improvement in quality of product. Pressure molding of radomes, however, is limited, practically, to solid-wall constructions. Here, the advantages include not only improved physical properties, but also close control of required wall thickness tolerances.

The problem shifts suddenly, however, when sandwich construction enters the picture. Here, the thickness tolerances of the skins are controlled by the choice of fabrics used. For example, three layers of type 181 glass cloth (nominal thickness 0.0085 in. per layer) will result in a skin approximately 0.030 in. thick, after allowance is made for "glue line" and laminating expansion. The core thickness is maintained by accuracy in slicing the honeycomb material. Tolerances of better than 0.005 in. can readily be held by a careful worker. Figures 12 and 13 show a simple jig adaptable to almost any band saw.

The sandwich is best molded under vacuum pressure. Use of more pressure will usually result in squeeding the resin from the impregnated skin, and depositing it into the core cells. The result is two-fold. First, the dielectric constant of the core, assumed to consist predominantly of air, rises sharply. This changes the wavelength of the microwave energy passing through, thus mismatching the sandwich and causing excessive reflections. Second, the reduced resin content of the skin causes a serious loss in bond between the layers of the skin, and thus weakens the sandwich structurally.

"Thin-Wall" Radomes

There are at present a large number of radomes in service of the so-called "thin-wall" type. The design of these housings is based upon the concept that a wall thickness of the order of one tenth of a wavelength or less will not adversely affect the operation of the enclosed radiating system. Obviously, this type of radome is limited to use where size is relatively small, since a typical wall thickness would be less than $\frac{1}{16}$ inch. Such thin walls cannot withstand much aerodynamic force.

The repair of damaged thin-wall radomes is performed in a manner similar to that of a rupture of one skin in a sandwich construction. It may sometimes be necessary to prepare a plaster mold, when the damage is of such character that the

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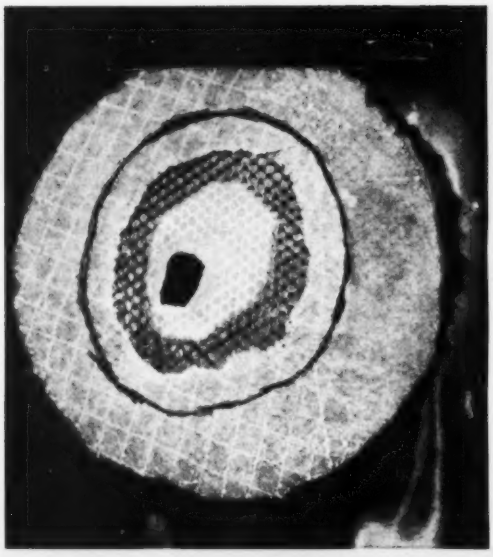


Fig. 6—Area around hole in radome, shown at left below, with honeycomb and inner skin removed, edges of outer skin feathered

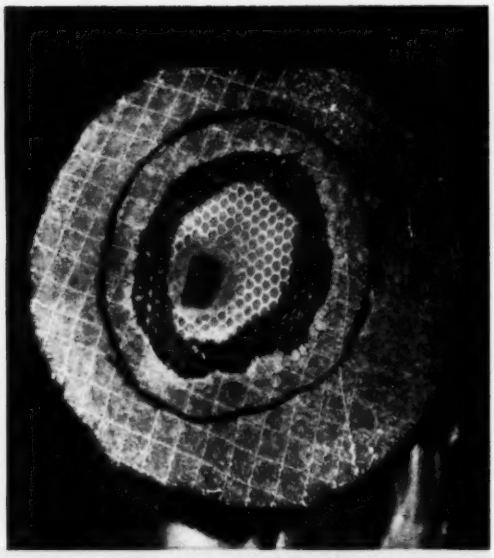


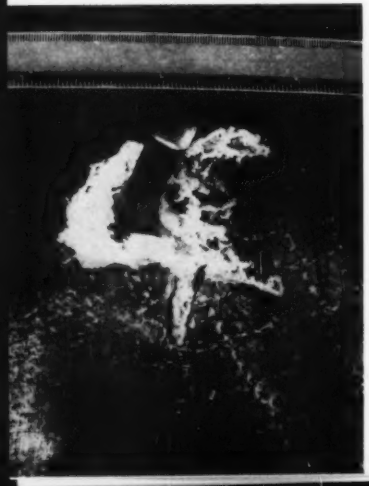
Fig. 7—Inner skin repaired with glass cloth. If the damaged area is large, inner skin patch may have to be cured first

application of pressure during repair might deform the shape. Again, the repair technician must not be swayed by a desire to "beef-up" the patch for additional strength. Wall thickness must be maintained.

The U. S. Naval Air Development Center, Johnsville, Pa., which has been the instrumentality of the Bureau of Aeronautics in developing a uniform program for repair of radomes throughout the country, has found it possible to make repairs of a major nature without deleterious effect on performance of electronic equipment. Figure 14 shows a repaired radome which had been damaged by rain erosion. Here, the outer skin was completely destroyed and the honeycomb core was severely damaged. As an experimental procedure, the contour was restored with modeling clay and a glass cloth mold was made directly from the nose of the radome. A complete new nose section, of proper skin and core thickness, was fabricated in the mold. The damaged nose was removed from the radome and replaced by the newly constructed section. Careful electronic measurements have shown that the repaired radome is at least as good as the original.

One of the most serious problems confronting the radome designer today is the effect of the dielectric wall on the performance of precision radar equipment. Because of the change in medium, from a rare material like air to a dense material (the laminating plastic), a phenomenon called "bore-sight shift" or "beam-bending" takes place. This is similar to the lens effect in optics, but is far more serious than other aberrations in its consequences. This problem also emphasizes the necessity for methodical accuracy in maintaining close tolerances in repair of radome walls.

Fig. 5—Hole in radome, as received. Patching method shown in Figs. 6 to 11



Minor Repairs

Occasionally, surface damage of small size is found on molded reinforced plastic parts. The impact of a stone, thrown against the radome from the runway by a wheel during takeoff, may result in a hole one half inch or less in diameter or a minor scratch which does not penetrate the outer skin, but is still an obvious defect. Such an imperfection may be satisfactorily repaired by the use of a resin loaded with milled glass fibers or glass flock. A thick paste is made from the mixture and worked into the hole or scratch with a flat blade or spatula. The use of the glass fibers prevents shrinkage of the resin during cure, provides a better bond to the original material, and precludes the possibility of future crazing of the small resin casting. Where damage in

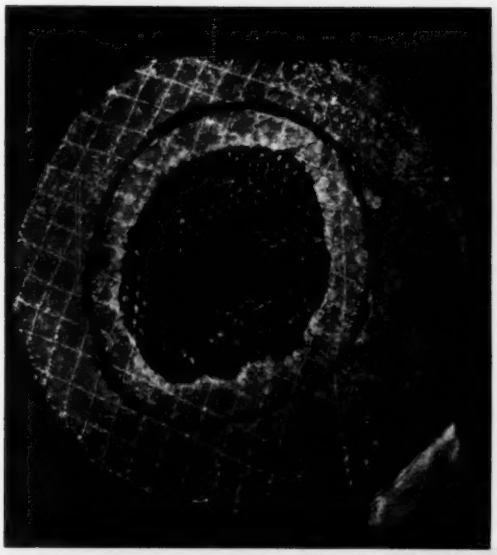


Fig. 8—Honeycomb core patch inserted. Patch is purposely cut somewhat oversize; note slight compression around outer edge

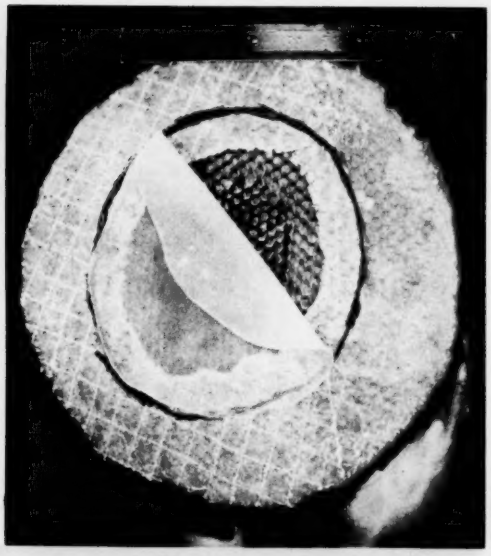


Fig. 9—First layer of outer skin patch being placed in position over honeycomb. Fig. 3 shows how successive layers are built up

Fig. 10—Outer skin patch has been built up. A sheet of cellophane held with cellulose tape applies pressure during cure

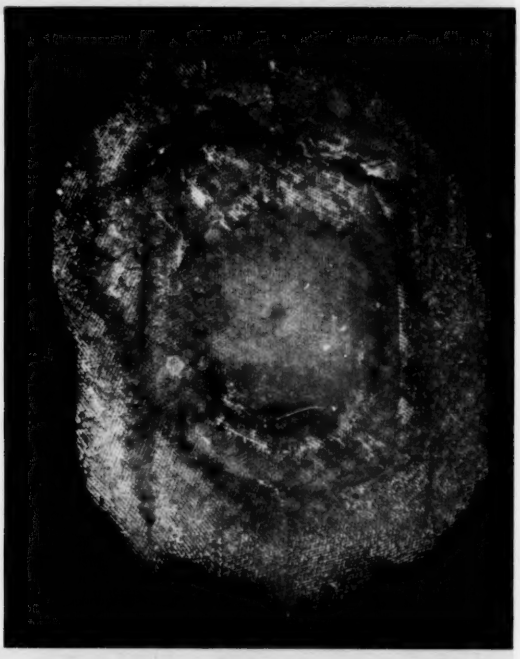


Fig. 11—Repaired section has been cured and sanded to a smooth surface. The area will next be painted to match rest of the radome

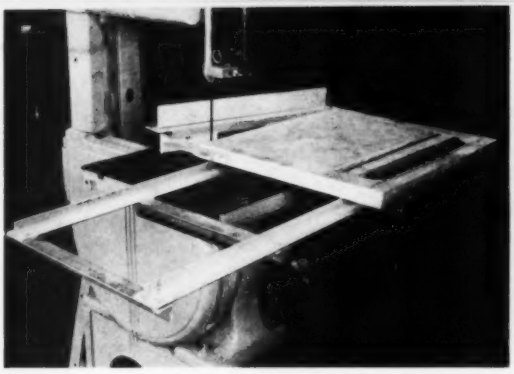


Fig. 12—Jig for cutting honeycomb material consists of a frame and track made to fit the band saw table, and a carriage with hinged fence

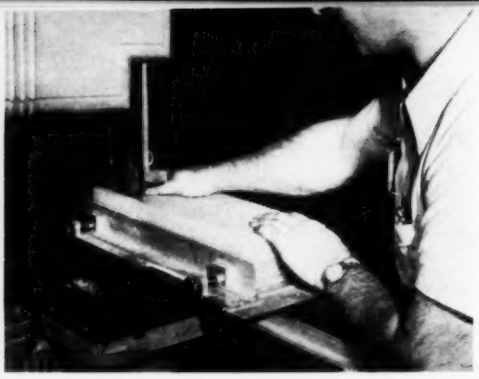


Fig. 13—Method of slicing honeycomb on special carriage. Thumb screws make it possible to cut the material to accurate thickness

this category encompasses an area no greater than one or two cells of the hexagonal honeycomb core, the filling of that section with a solid paste will not seriously affect performance. Judgment should be used, however, to avoid extending the use of this method to the point where the mass of dielectric material would be such as to enter into the electrical problem.

Often, it will be found that a laminated part has been dropped or struck by a heavy object, leading to delamination. This defect can readily be found by tapping the laminate with a small tool or coin. A sound area will respond with a sharp, metallic ring, while a delaminated section will be soft and will sound dull or damped.

Such damage can readily be repaired by the use of a hypodermic needle with an inside bore of about 0.020 inch. Actual technique will vary with the size of the delaminated area, but the normal procedure would involve drilling several No. 60 holes, spaced throughout the area. Sufficient catalyzed resin to insure contact with all separated surfaces is inserted into these holes. The area is then covered with cellophane, pressure is applied, and cure is effected. If properly done, this procedure will result in a sound bond, with no measurable effect on structural strength of the laminate.

Fig. 14—Radome on which entire nose section (unpainted) has been replaced

Driers Required

In the repair of reinforced plastics, it must be remembered that many of the "contact" resins are air-inhibited. This means that, although they will polymerize in the presence of air, a soft, tacky surface will almost always remain. To overcome this, it is advisable to add about 0.5% of cobalt octoate or cobalt naphthenate as a drier. The latter compound is known commercially as Nuodex, obtainable from the Nuodex Corp., Elizabeth, N.J.

In view of the fact that honeycomb core material consists mostly of air, it is recommended that a cobalt drier be used in all resin impregnants intended for use in repair of sandwich construction. The same is true when resin coatings are to be applied as finish coats for reinforced plastics parts. The use of drier does not, however, obviate the necessity for covering the surface with a cellophane film. The film will reduce access of air and will also provide a smooth surface against which the resin may cure.

With the techniques developed for the repair of radomes as a starting point, it has been found feasible to extend the patching procedures to damaged structural sections. Wing-tips, stabilizer sections, fins, etc., on aircraft, as well as boats, sleds, camera cases, and other relatively large and expensive parts are included in this category.

Except for the delicacy required by electronic problems, the repair of these items is performed in the same manner as that of radomes. One of the factors that enters consideration with non-electrical parts is the finish applied. Paints, rubber coatings, or similar surface treatments must be completely removed before any attempt is made to effect a repair. The use of commercial paint removers or strippers for this purpose is not recommended, because of possible deleterious effect on the laminate. It is best to use sandpaper and elbow-grease.

A conservative estimate of anticipated savings to the Navy resulting from the recently initiated radome repair program runs upward of one million dollars a year. From the viewpoint of a taxpayer, this is definitely a step in the right direction. From a logistic viewpoint, the importance is even greater. Radomes have never been plentiful, and the repair of damage by authorized field activities will effectively increase the supply to the point where aircraft that would otherwise have been grounded for some time will now be made ready for use with a minimum of delay.

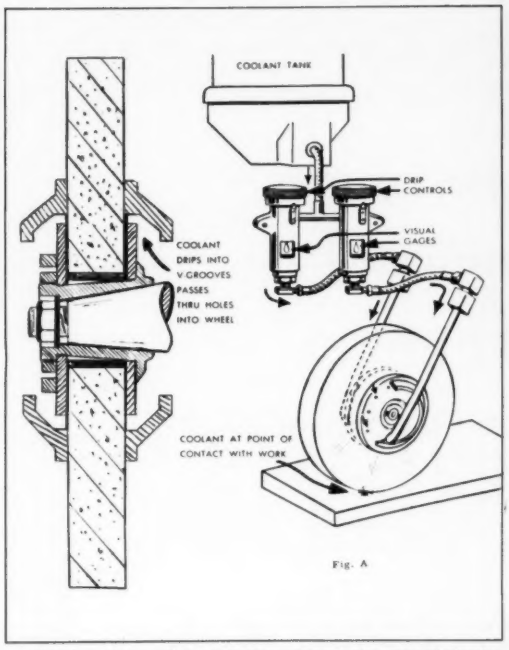
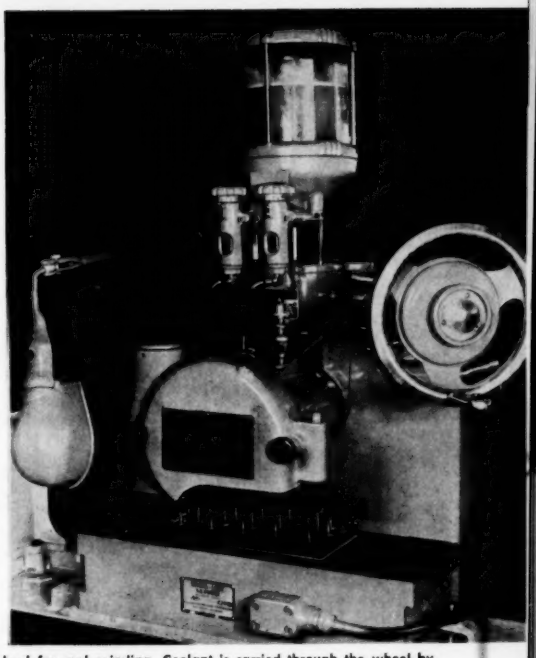


Fig. A



Drawings show method of feeding coolant to the center of abrasive wheel for cool grinding. Coolant is carried through the wheel by centrifugal force so that it is applied where it is most needed. At right: Installation of commercial equipment for cool grinding

Cool Grinding

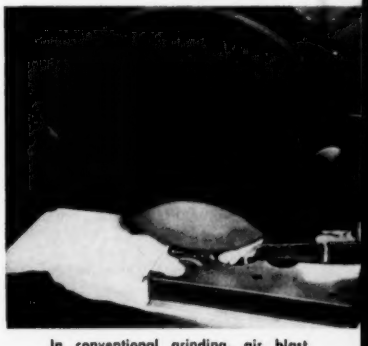
by H. POTTLE*

A NUMBER of benefits are realized when a new cool grinding technique developed by DoALL is applied in tool grinding. In grinding, just as in any machining operation, increased production and longer tool life are obtained if the cutting tools are cooled. Each abrasive grain in a grinding wheel is an individual tool, just as much as is the bit in a production lathe; if each grain receives a constant flow of coolant it will cut faster, last longer, produce a better finished surface.

In the new cool grinding technique, the coolant is actually fed through the wheel. No special wheels are required because all of the ordinary vitreous-bonded wheels are sufficiently porous to permit the flow of coolant. The coolant is fed through the wheel by centrifugal force which atomizes the solution, flushing the wheel and thus preventing loading and glazing. It has been shown that the actual cutting temperature with cool grinding may be as much as 600° lower than when ordinary coolant systems are used. In addition, the work is 100% visible —an important feature in form and shoulder grinding.

The ordinary way to reduce grinding temperatures is to pump a coolant solution onto the work piece while it is being ground. Some of the heat is thus carried away, but in most cases there is no coolant present at the point where it is most needed—under the grinding wheel. The air blast created by the wheel forces the coolant away. It is thus obvious that the cool grinding technique has proven advantages over ordinary coolant methods and especially so in the grinding of hard, tough abrasion resistant alloys.

Since it is heat which causes practically all grinding difficulties, anything which will reduce grinding temperatures will provide better results. Cool grinding provides the first real improvement in grinding techniques to be made available in the past 50 years.



In conventional grinding, air blast blows coolant away from work point

* Grinder Div., DoALL Co., Des Plaines, Ill.

Effect of Extruder Variables on Properties and Output of Polyethylene Film

by W. A. HAINE AND W. M. LAND†

Compound extrusion and output rate, die orifice clearance, hot stretch distance, and bath temperature have but small effect on specular gloss, light transmission, and haze of polyethylene film within the operating limits investigated. Blocking is substantially reduced when hot film is extruded into a water bath at temperatures of 85°-90° C. Film extruded from DE-2400 Natural polyethylene is reduced somewhat in blocking tendency by lowering the compound temperature, decreasing the hot stretch distance, increasing the extruder output rate, or by a combination of these adjustments. The modulus of elasticity (stiffness) is significantly increased by quenching the hot extruded film in 85°-90° C. water.

A definite increase in extruder output rate is produced by the following: screw speed increase; screw temperature increase—to an optimum value in the range of the resin melting point (105°-110° C.); increase of breaker plate screen mesh opening. The compound output temperature depends upon the output rate for a given set of extruder conditions. Compound temperature varies inversely as the compound rate for a given extruder heat capacity.

Stretchability of the hot extruded film and appearance of the finished film limit the usable extruder capacity. Low compound temperatures result in nerviness (elastic strain recovery within the hot sheet) and poor stretchability immediately after exit from the die.

IN THE years since the war, extruded polyethylene film has found rapidly expanding use as a packaging material, chiefly because of its properties of water and chemical resistance, non-toxicity, and low temperature flexibility. It is used both as unsupported film and as a paper coating, the latter often applied by an extrusion laminating process.

Considerable progress has been made in film extrusion techniques, which are of two basic types; both involve extruding a film thicker than ultimately desired and hot-stretching to the required thickness. In the first method, flat film is extruded directly from dies as wide as 100 in. and cooled, normally in a water bath. In the second method, the film is extruded from a circular tube die and is usually drawn vertically upward and simultaneously inflated with air. While the tubing method offers some advantages in eliminating the necessity for die end adjustment and edge trimming of the finished film, the flat film extrusion process allows for simpler cooling and wind-up systems and can be used for direct lamination paper coating.

Experiments were designed to show what variations in physical properties of extruded thin polyethylene film (DE-2400 Natural) are produced by variations in extruder, die, and cooling bath, using a flat, thin film die. Normally, polyethylene extruded into a cold water bath yields film which is glossy on the surface and fairly transparent. These qualities, although desirable for attractive packaging purposes, unfortunately render the film prone to block in bulk form. This type of film is considered tacky to the feel in that it does not slip on itself and is hard to handle during hand and machine packaging operations.

Another objective was to determine the most advantageous operating conditions for increasing of film output of a given extruder at a high quality level.

Equipment

The extruder used was a John Royle and Sons No. 2, 3¼-in. screw diameter. The screw was full flight, constant depth, decreasing pitch,

*Reg. U.S. Pat. Office.

† Development Laboratories, Bakelite Co., Div. Union Carbide and Carbon Corp.

Table I—Temperatures of Extrusion Cylinder, Head, and Die[a]

	Cylinder heating section				
Compound temperature	*Back[b]*	*Middle*	*Front and breaker plate[b]*	*Head*	*Die*
°C.	°C.	°C.	°C.	°C.	°C.
165	50	165	185	185	195
235	50	178	195	255	265

[a]Screens: 40, 80, 100, 40 mesh.
[b]Estimated from steam pressures.

and cored for temperature control medium. The barrel was heated by steam, the screw by hot water or steam, and the head and die by electric heaters with manual voltage control. The die was 24 in. wide, had adjustable lips, and was heated in three 8-in. sections with 900 watts each, plus 50 watt cartridge heaters in the end plugs.

The wind-up was provided with variable speed rolls, an auxiliary cooling tank, and steam coils for heating. The take-off assembly is shown in Fig. 1.

Extrusion Variables

Five variables—compound temperature, compound rate, cooling bath temperature, hot stretch distance, and die orifice clearance—were each considered independently as to their effects on the properties of extruded DE-2400 Natural polyethylene film.

Compound extrusion temperatures of 165° C. (329° F.) and 235° C. (455° F.), obtained by varying the cylinder, head, and die temperatures (Table I), were selected. It was found that the tendency of the film to tear at the edges, particularly at low compound temperatures and long stretch distances, could be reduced by holding the die ends at a temperature approximately 10 degrees C. (18 degrees F.) higher than the center. This practice also aided in making adjustments to obtain a film of uniform thickness. Thus, at the lower compound temperature, the resin left the die at 160° C. (320° F.) in the center and 170° C. (338° F.) at either end. Since preliminary experiments had shown that attempts to reduce the compound temperature below 164° C. (327° F.) resulted in serious trouble with edge-tearing, particularly for a long stretch distance, 165° C. (329° F.) was the lower end of the practical compound temperature range. Attempts to provide enough heat by conduction to keep the compound extruding at temperatures above 235° C. (455° F.) were also found impractical, because of limits on steam pressure and heat transfer area. The upper compound temperature selected was therefore 230°-240° C. (446°-464° F.). Compound temperatures were obtained by rolling up hot extruded film on a dial thermometer rotated just below the die orifice.

Compound output rate is a function of many variables including die opening, compound temperature, screw speed, screw temperature, cylinder temperature, and screen size. If all variables except screw speed are held constant, compound output rate is regulated by screw speed. Compound rate for the extruder used in this study is correlated with screw speed and compound temperature in Table II. Two compound output rates were selected for investigation, 19.8 and 41.4 lb./hr., which corresponds approximately to screw speeds of 12 and 30 r.p.m., respectively. The lower rate represented the minimum practical rate consistent with constant extruder throughput at high compound temperature. The higher compound rate of 41.4 lb./hr. was selected for two reasons. Higher rates would have

Table II—Screw Speed and Compound Temperature Versus Compound Output Rate

Screw speed	*Compound temp.*	*Compound output*
r.p.m.	°C.	*lb./hr.*
12	165	18.6
	195	19.8
	235	21.0
30	165	39.0
	195	41.4
	235	43.2

Fig. 1—Take-off assembly for extruded thin film of polyethylene

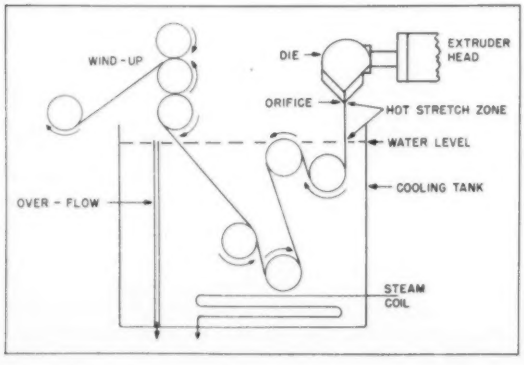


Fig. 2—Effect of screw speed and temperature on compound output

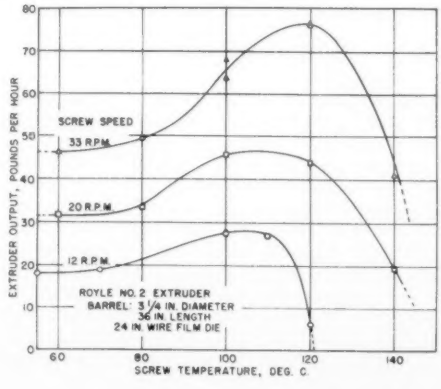


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Table III—Effects of Extruder Variables on Characteristics of Extruded Polyethylene Film[a]

Extruder variable	Blocking tendency	Specular gloss	Light transmission	Haze	Gas transmission CO_2 dry	CO_2 wet	O_2 dry	O_2 wet	Tensile strength[b] MD	TD	Elongation[b] MD	TD	Shrinkage[b] MD	TD[c]
Increasing compound temp.	+1	+1	0	−1	−2	−2	−1	−1	−2	+1	+2	0	−1	−1
Increasing cooling bath temp.	−2[d]	0	0	+1	0	−1	−1	−1	+1	+1	0	0	−1	0
Increasing compound output rate	−1	0	0	+1	−2	−2	−2	−2	+2	+1	0	0	+1	+1
Increasing hot stretch distance	+1	+1	0	−2	−2	−2	−1	0	−2	0	+1	−2	−1	−1
Increasing die orifice opening	+1	+1	0	+2	+1	0	−1	−1	+1	0	+2	+3	+2	+1

[a] Code for ratings: 0 = no effect on characteristic; +1 = very slightly increases characteristic; −1 = very slightly decreases characteristic; +2 = slightly increases characteristic; −2 = slightly decreases characteristic; +3 = noticeably increases characteristic.
[b] Code for direction of test specimen: MD = Machine Direction; TD = Transverse Direction
[c] The film expands in this direction.
[d] Up to 80° C; film cooled in 85°-90° C. water exhibited even less blocking tendency.

made it impossible to maintain the desired compound temperatures due to the limited heating capacity of the extruder, and the top speed of the wind-up mechanism was consistent with this output rate at the desired stretching or draw down ratio.

Two water quench bath temperatures were first selected, 20° C. (68° F.) and 80° C. (176° F.), the former being the lowest that could be maintained constant conveniently with the water supplied, and the latter being the maximum above which local boiling occurred in the area where the hot film entered the water. Boiling caused bubbles and roughness in the film. Later work indicated that interesting results can be obtained with a high temperature water bath, 85°-95° C. (185°-203° F.). Special techniques of water circulation prevented boiling where the hot resin entered the bath. This involved placing two pipes, each containing a series of small outlet holes, in close proximity to the hot film as it entered the water bath. The hot water was rapidly circulated through the pipes by a centrifugal pump.

The extreme hot stretch distances were dictated by space limitations of the existing equipment. A distance of 2 in. was as close as the die orifice and water level could be brought together, while 9 in. was the maximum possible distance between these two.

Two die orifices, 10 and 15 mils, were selected for use in this study. In each case film was drawn down to 1.5 mils at the take-off, because constant sample thickness throughout the study was desirable. The resultant stretch ratios were therefore 6.6 and 10. Since continuous film was difficult to obtain at low compound temperatures when stretch ratios greater than 10 were employed, and since mechanical difficulty was encountered in attempting to set the die orifice at less than 10 mils, 10 and 15 mils were found to be practical die orifice values.

Table IV—Typical Physical Properties of Extruded Polyethylene Film[a]

Property	Test method	Typical value
Blocking tendency	See text	3
Specular gloss	See text	5.8
Light transmission	ASTM D 1003-49T	91%
Haze	ASTM D 1003-49T	15%
Tensile strength	ASTM D 882-49T	
Machine direction		1800 p.s.i.
Transverse direction		1250 p.s.i.
Ultimate elongation	ASTM D 882-49T	
Machine direction		270%
Transverse direction		390%
Shrinkage	10-in. square,	
Machine direction	100° C., 1 hr.	6 %
Transverse direction		+ 1.4%
Gas transmission, @ 23° C.	(See "Gas Permeability	
CO_2 — dry	of Low Permeability Film,"	2700 cc/100 sq. in./day
CO_2 — 100% humidity	*Modern Packaging*	2700 cc/100 sq. in./day
O_2 — dry	Oct. 1946.)	575 cc/100 sq. in./day
O_2 — 100% humidity		575 cc/100 sq. in./day

[a] DE 2400 Natural film, 21 in. wide, 0.0015 in. thick

Effect on Film Properties

Only small changes in extruded film characteristics were produced by the changes in the extruder variables. These are summarized in Table III. Typical physical properties of the polyethylene film produced are given in Table IV.

Blocking—The following arbitrary, semi-quantitative test was employed: Samples of film to be tested were cut into squares approximately 2 by 2 in. and stacked in layers of four each. A 1 in. square glass plate and a 1.5-lb. weight were placed on the center of each pile of film squares. A compressive stress of 1.5 p.s.i. was thus exerted on the film. The samples were subjected to this stress for 24 hr. at 60° C. (140° F.), after which the layers of film were carefully separated. If the layers separated easily, the sample was given a blocking tendency of 0; if they could be separated only with the greatest difficulty, they were

(*Continued on p. 116*)

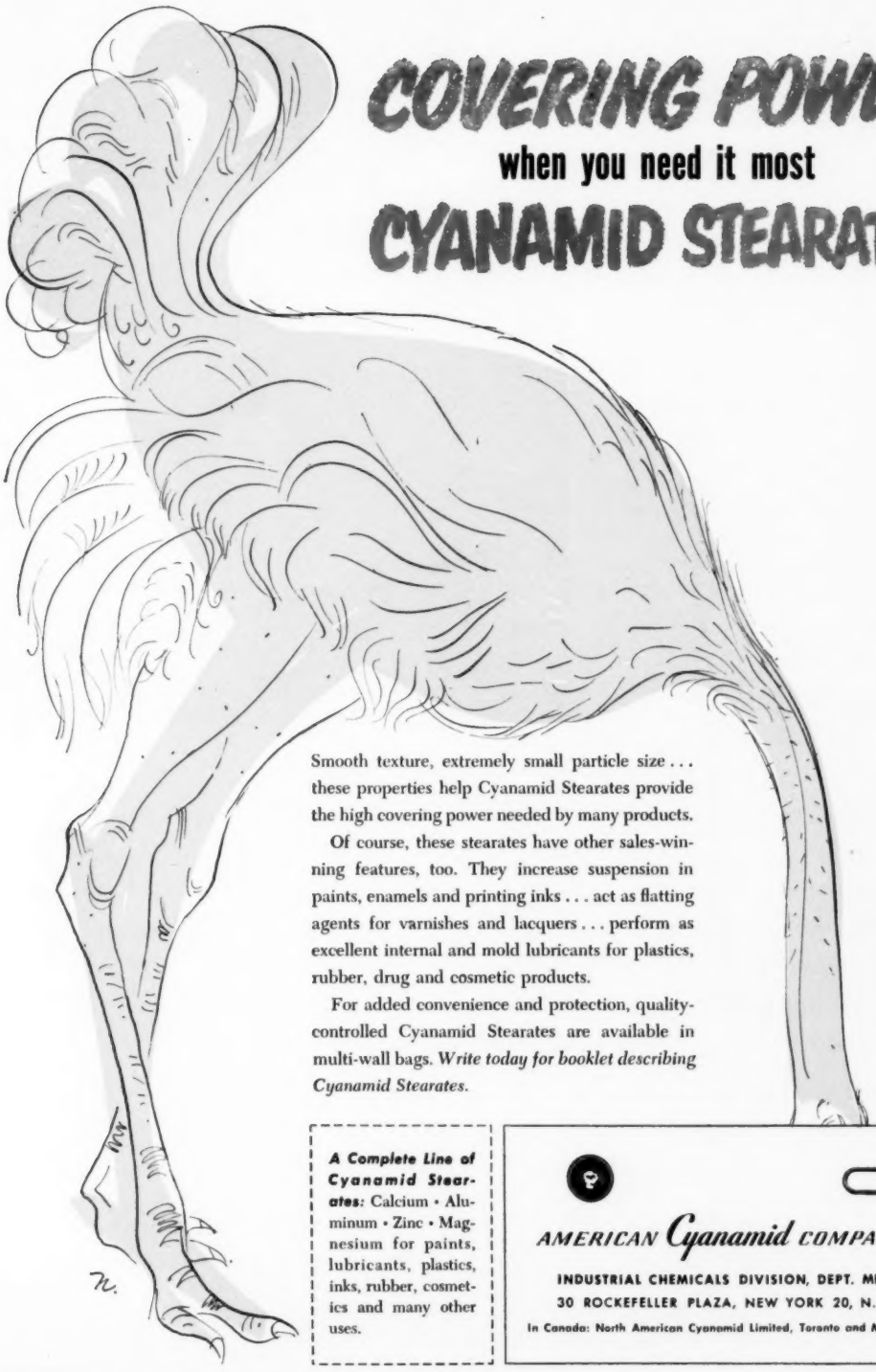

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Table V—Extruder Variables[a] Versus Film Blocking Tendency

Compound output	*Compound temp.*	*Hot stretch distance*	*Cooling bath temp.*	*Blocking tendency[b] of film*
lb./hr.	°C.	*in.*	°C.	
19.8	165	2	20	2
			80	1
		9	20	4
			80	2
	235	2	20	4
			80	2
		9	20	4
			80	2
41.4	165	2	20	2
			80	1
		9	20	2
			80	2
	235	2	20	4
			80	2
		9	20	4
			80	2

[a] Die orifice = 10 mils.
[b] Higher numerical values indicate higher blocking tendency (see text).

rated 4; 1, 2 and 3 were intermediate ratings of blocking tendency.

The effect of extruder variables on blocking tendency is shown in Table V. Although reductions in blocking are not large, it is evident that blocking tendency is less pronounced at the lower compound temperature and higher bath temperature. Film that had been cooled in an 85° C. (185° F.) bath exhibited a much reduced blocking tendency. For example, rolls of film 1.5 mils thick were produced, one using a 40° C. (104° F.) bath and one from an 85° C. (185° F.) bath. After shelf aging for 1 week, these rolls were unwound to determine the relative degree of blocking. The film from the 85° C. (185° F.) bath could be unwound without evidence of blocking, whereas the 40° C. (104° F.) bath film showed severe sticking between layers. The latter film was more glossy and transparent than the film from the hotter bath. Furthermore, the 85° C. (185° F.) film exhibited a drier feel with good slip between layers. Die opening was observed to have little or no effect on blocking tendency.

Other Physical Properties—Specular gloss values obtained are summarized in Table VI. Here it is apparent that compound extrusion rate, bath temperature, and stretch had little effect on the specular gloss. High compound temperature, however, favored increased gloss. Orifice size was found to have no appreciable effect.

The effects on film haze are presented in Table VII. Haze was reduced by decreasing the compound extrusion rate and using the longer hot stretch distance. Haze was also reduced by using the higher compound temperature and cooler bath. A very small increase in haze was effected by increasing the orifice from 10 to 15 mils.

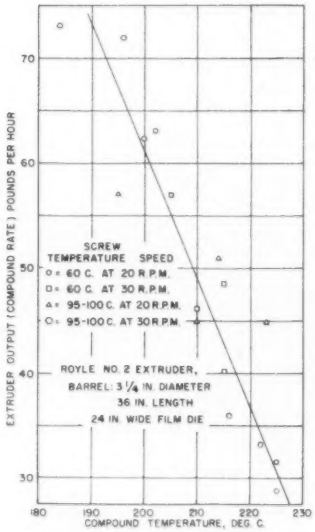

Fig. 3—Effect of the extruder output rate variations on compound temperature

Light transmission was substantially unaffected by extruder conditions. An average value of 91% light transmission was obtained for the samples examined, with no value less than 89% and no value greater than 92 percent.

Tensile strength was slightly greater in both machine and transverse directions with the higher

Table VI—Extruder Variables[a] Versus Film Specular Gloss

Compound output	*Compound temp.*	*Hot stretch distance*	*Cooling bath temp.*	*Specular gloss[b] of film*
lb./hr.	°C.	*in.*	°C.	
19.8	165	2	20	3.82
			80	4.88
		9	20	4.40
			80	4.50
	235	2	20	3.98
			80	8.35
		9	20	6.78
			80	9.04
41.4	165	2	20	5.07
			80	3.69
		9	20	7.26
			80	6.59
	235	2	20	4.14
			80	5.75
		9	20	7.37
			80	4.92

[a] Die orifice = 10 mils.
[b] Specular gloss (in tenths of a % of light incident) is expressed as the fraction of the incident light multiplied by 1000 which is reflected at the specular angle.

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Table VII—Extruder Variables[a] Versus Film Haze

Compound output	*Compound temp.*	*Hot stretch distance*	*Cooling bath temp.*	*Haze[b] of film*
lb./hr.	°C.	in.	°C.	%
19.8	165	2	20	17.4
			80	19.4
		9	20	12.1
			80	17.8
	235	2	20	13.2
			80	11.2
		9	20	11.0
			80	11.0
41.4	165	2	20	18.8
			80	21.0
		9	20	15.9
			80	16.6
	235	2	20	16.6
			80	21.0
		9	20	10.0
			80	11.0

[a]Die orifice = 10 mils.
[b]Haze values determined by ASTM D 1003-49T; the higher the percentage, the greater the film haze.

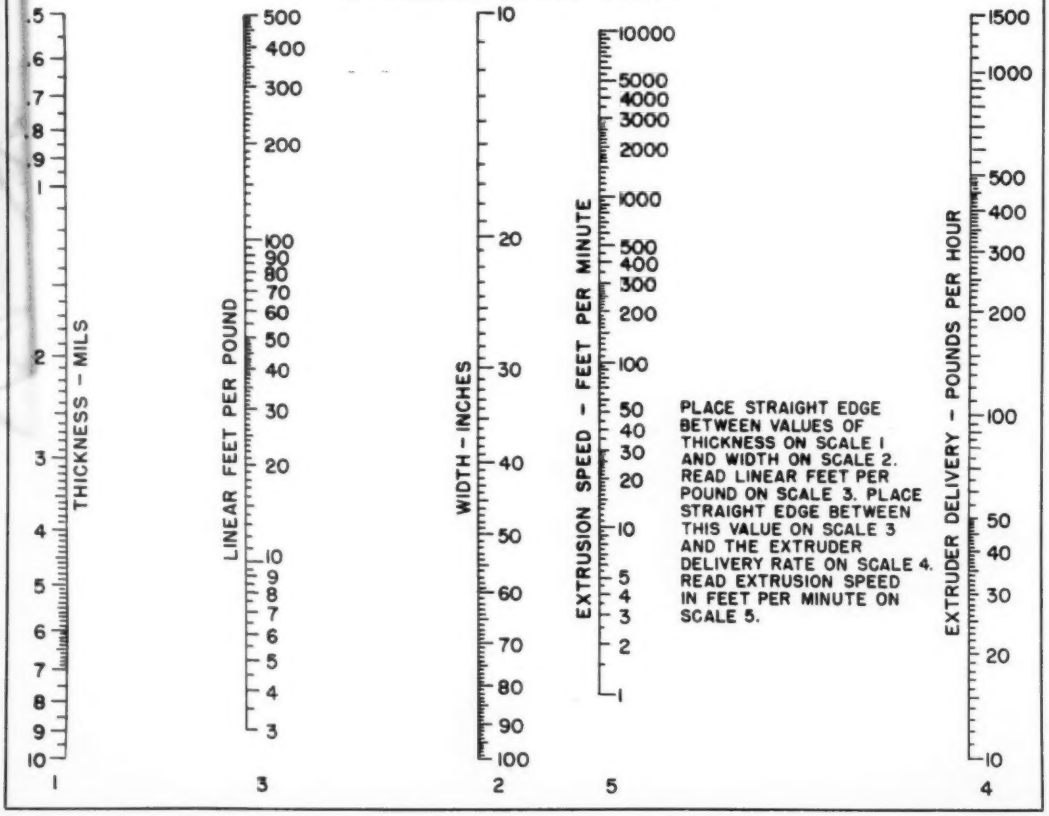
compound extrusion rate and higher cooling bath temperature. In the machine direction, tensile strength was greater at the lower compound temperature and shorter hot stretch distance. These variations produced no effect in transverse elongation.

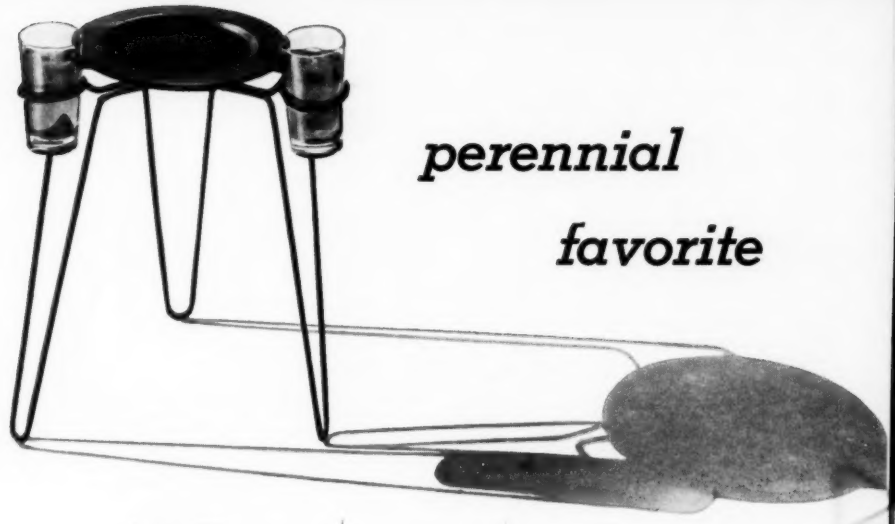
Small reductions in shrinkage in both directions were obtained by increasing the compound temperature and hot stretch distance, and by decreasing the compound rate and utilizing the smaller die orifice. In the transverse direction, the shrinkage values are negative, i.e., the sheet expands in width.

Samples of 1.5 mil film extruded into 40° C. (104° F.) and 85° C. (185° F.) water baths were tested for modulus of elasticity.[1] A significant increase in stiffness (Table VIII) was obtained by cooling the film in hot water. Very possibly, this

[1]R. H. Carey, E. F. Schulz, and G. J. Dienes, *Ind. Eng. Chem. 42*, 842 (May 1950).

Fig. 4—Nomograph for polyethylene flat film production





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result is an effect of crystal growth within the resin, as indicated by greater transparency of cold-water-quenched film. It is also believed that the crystallinity affects the surface of the film, thus accounting for the improved slip properties of the hot-water-cooled film.

Permeability—Gas permeability was determined for two gases, oxygen and carbon dioxide, both dry and at 100% relative humidity. In all four cases, increased compound extrusion rate as well as compound temperature led to only very slightly decreased permeability. Increasing the cooling bath temperature had no effect upon dry CO_2 but decreased the other permeabilities slightly. Increasing the hot stretch distance had no effect on wet O_2 but decreased the other permeabilities. The die orifice effect was irregular and small.

Table VIII—Mechanical Properties of Polyethylene Film[a] Versus Cooling Bath Temperature

Property	*Cooling bath temperature*	
	40° C.	*85° C.*
Initial tangent modulus of elasticity (stiffness), p.s.i.	12,200	15,900
Stress at elastic limit, p.s.i.	425	560

[a]DE-2400 Natural polyethylene; 1.5 mil film.

Table IX—Cylinder Section Temperature Gradient Versus Compound Output Rate and Temperature of DE-2300 Natural Polyethylene Film

Run	*Cylinder section temperature*				*Screw speed*[a]	*Compound output*	*Compound temp.*
	Hopper	*Middle*	*End*	*Head*			
	°C.	°C.	°C.	°C.	*r.p.m.*	*lb./hr.*	°C.
A	50	150	170	190	20	37.2	210
B	50	170	190	190	20	38.4	215
C	50	190	190	190	20	39.3	211
D	50	150	170	190	30	53.1	200
E	50	170	190	190	30	54.0	200
F	50	190	190	190	30	52.2	205
G	50	190	100	20	30	52.8	205

[a]Screw temperature = 60°-65° C.

Usable Compound Output Rate

The effects of screw temperature, cylinder section temperature gradient, and breaker plate screen size on usable compound output rate were each investigated in conjunction with screw speed variation. Two types of resin, DE-2400 Natural and DE-2300 Natural, obtained from stock supplies, were used for these studies. The extruder head and die were maintained at constant temperature as follows: head 225° C. (437° F.); die ends 250° C. (482° F.); and the die center 225° C. (437° F.).

Compound temperature and output rate were measured at approximate 5-min. intervals during a 30-min. running time at each extrusion condition. It was found that with controlled barrel and screw temperatures the extruder reached equilibrium, as judged by uniformity of compound rate within 15 min. after the changes.

The screw temperature was controlled by steam and water mixtures by means of a mixing valve. The temperature of the water entering and leaving the screw was measured with well-type Weston thermometers set in the inlet and outlet lines.

Screw Temperature—To study the effects of screw temperature on compound temperature and output rate, the extruder cylinder temperature was maintained constant with a gradient across the heating sections, from hopper to breaker plate, as follows: 70° C. (158° F.), 170° C. (338° F.), 190° C. (374° F.) (Steam pressures were 0, 100, and 180 p.s.i., respectively.) With screw speed constant, the screw temperature was varied from 60° C. (140° F.) to 140° C. (284° F.), as shown in Fig. 2 (See p. 110). The maximum output rate was obtained in each case at a screw temperature in the vicinity of 100°-120° C. (212°-248° F.), and close control of the screw temperature was found necessary to maintain the maximum output rate. The output decrease at screw temperatures above 105°-120° C. (221°-248° F.) was observed to be caused by resin clogging the screw due to its softening prematurely, and thus effectively reducing the displacement volume of the screw over the whole screw length. At temperatures of 130°-150° C. (226°-302° F.), the screw became fouled to the point where the output rate was virtually reduced to zero. When the screw was thus blocked, neither forward pressure nor forward displacement was developed, and the soft resin merely turned with the screw. From Fig. 2 (see p. 110) it is evident that the screw

(*Continued on p. 196*)

Table X—Effect of Screen Mesh Size and Screw Temperature and Speed on Film Output Rate, Temperature, and Appearance

Screen mesh[a]	*Screw temp.*	*Screw speed*	*Compound output*	*Compound temp.*	*Film appearance*
	°C.	*r.p.m.*	*lb./hr.*	°C.	
40	60-65	20	36	216	Smooth
		30	57	205	Rough
	95-100	20	57	195	Rough
		30	73	184	Very rough
100	60-65	20	31.6	225	Smooth
		30	46.2	210	Smooth
	95-100	20	45.0	223	Smooth
		30	63.2	202	Rough
200	60-65	20	33.3	222	Smooth
		30	48.6	215	Smooth
	95-100	20	51.0	214	Smooth
		30	72.0	196	Rough
500 x 28	60-65	20	28.8	225	Smooth
		30	40.2	215	Smooth
	95-100	20	45.0	210	Smooth
		30	62.4	200	Slightly rough

[a]Minimum screen size in screen pack; Tyler standard screens.

PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed.

General

WOOD. A. J. Stamm. Ind. Eng. Chem. 43, 2276-9 (Oct. 1951). New developments that increase the service life of wood or produce wood products with improved properties have been reported in the literature since the last review on the subject in October 1949. Included are reviews on investigations of preservative and fire-retardant treatments for wood, strength properties of wood, wood structures, and production and properties of plywood, laminated wood, and modified woods. Structural fiberboards are included for the first time. These are gaining rapidly in importance and show promise of being suitable for various chemical engineering uses. 83 references.

ELASTOMERS. H. L. Fisher. Ind. Chem. 43, 2227-35 (Oct. 1951). Pertinent literature published during the past year dealing with natural and synthetic rubbers is discussed. The war in Korea has brought about an increase in the production of synthetic rubber and an increase in the amount of natural rubber imported by the United States. Articles dealing with the production, price, and improvements in the preparation of natural rubber are reviewed. The emphasis in this review on elastomers is on synthetic rubber as regards its price, production, processing, derivatives, reactions, properties, and applications. 161 references.

HARD RUBBER. H. Peters. Ind. Eng. Chem. 43, 2256-7 (Oct. 1951). In spite of its heritage of almost 100 years, hard rubber has progressed rather slowly but still remains as a thermosetting material of special interest. The effects that compounding, processing, and curing have on plastic yield, impact strength, and dielectric properties continue to be subjects of investigation. Renewed studies are being made to reduce the frictional coefficient as well as increase the flame resistance of ebonite. Use of synthetic elastomers for ebonites is slowly gaining momentum. Patents covering the use of hard rubber are numerous and interesting for this year. 45 references.

PAINT. J. C Moore. Ind. Eng. Chem. 43, 2251-5 (Oct. 1951). Technical progress in the paint industry is accelerating. Many new raw materials have become available during the past year, and these have made possible production of improved paints in general. This article briefly describes each new product as well as some new testing procedures. 71 references.

Materials

USE OF POLYISOBUTYLENE IN ADMIXTURE WITH POLYTHENE TO PROVIDE AN IMPROVED CABLE DIELECTRIC. H. F. Wilson. Brit. Plastics 24, 309-13 (Sept. 1951). The addition of 5 to 15% polyisobutylene to polyethylene results in improvements in physical characteristics and resistance to environmental cracking with negligible changes in electrical insulating characteristics. Detailed data on the properties of these mixtures are reported.

FILM-FORMING PROPERTIES OF CELLULOSE ACETATE PROPIONATES. A. G. Roberts and S. G. Weissberg. Ind. Eng. Chem. 43, 2088-98 (Sept. 1951). This investigation was undertaken to determine the suitability of cellulose acetate propionate as the film-forming base for airplane dopes. Preliminary tests had indicated that this material might be superior to cellulose acetate butyrate dope in adhesion and low temperature flexibility. This report describes relationships found between the chemical constitution of cellulose acetate propionate esters and such properties as solubility in organic solvents, dilution tolerance for aromatic and aliphatic diluents, compatibility with plasticizers, and the shrinkage, flexibility, and clarity of films formed from mixtures of cellulose acetate propionate with the various solvent diluent-plasticizer combinations. Selected formulas appear promising as airplane dopes. Mechanisms of film shrinkage and plasticizer action are discussed. Comprehensive data on the solution and film properties of cellulose acetate propionate should not only save much valuable investigative time for airplane dope designers, but should make possible the selection of formulations for many other applications directly from the data given.

SARAN-COATED PAPER. L. M. Burgess. Modern Packaging 25, 117-21 (Sept. 1951). Hot-melt, saran-coated paper is a fledgling among the other thermoplastic coatings such as polyethylene and particularly vinyl. It is superior to polyethylene-coated paper in its impedance to water vapor and to gases. It is superior to polyethylene-coated paper in grease and solvent resistance. It is comparable to polyethylene in its resistance to acids and in heat sealability. It is slightly inferior to polyethylene in alkali resistance and quite inferior in low-temperature flexibility. In relation to the oriented saran free film, saran-coated paper, while not transparent, is easier to fabricate, does not shrink with temperature, and does not stick to the sealing bars. Saran-coated paper is produced in two grades: a non-toxic, odorless, and tasteless coating for food and a carbon-black pigmented grade for non-food or industrial uses. The industrial coated paper is used in the packaging of small machine parts, photo film camera parts, and small bearings. In the food field it is being considered as a cap liner and a packaging material for frozen foods, dehydrated foods, dairy products, and cosmetics.

PLASTIC FLOW OF ANILINE-FORMALDEHYDE RESINS. L. K. Dalton. Australian J. Applied Sci. 2, No. 1, 132-44 (1951). The Rossi-Peakes' resins. It was found that the rate of flow test was used to examine the plastic flow of aniline-formaldehyde flow of the resin passed through a minimum as the condensation time during preparation increased. Small changes in the molecular proportion of formaldehyde of the order of 0.05 affected the flow considerably, but the proportion of hydrochloric acid and the concentration of aniline were much less critical. The pH

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at coagulation had a considerable influence. Furfural assisted the thermosetting of aniline resins as well as improving the initial flow. Paraformaldehyde hardened the resin and diminished the flow. Hexamine had little influence. Primary and secondary amines, as plasticizers, gave the greatest increase in flow; of those tested benzylaniline is considered the best. The changes in the flow which occurred when conditions of preparation were varied are not readily explained by the structures usually assigned to the aniline-formaldehyde resins.

Molding and Fabricating

IMPORTANCE OF THE SCREW TEMPERATURE IN EXTRUSION. Brit. Plastics *24*, 308, 308a (Sept. 1951). The effect of variations in screw temperature on the properties of the product in the extrusion of plastics is discussed.

PRESSURE DISTRIBUTION IN THE CALENDERING OF PLASTIC MATERIALS. J. T. Bergen and G. W. Scott, Jr. J. Applied Mechanics *18*, 101-6 (Mar. 1951). In the calendering or rolling of a plastic material into sheet form by passing it between parallel rolls, hydrostatic pressure is exerted against the surface of the roll throughout the region of contact with the plastic mass. This pressure was measured by means of a pressure-sensitive cylinder, inserted in the body of a 10-in. diameter roll, together with high-speed oscillographic technique. The materials which were calendered consisted of a resin which exhibited flow properties characteristic of a viscous liquid, and several filled plastic compositions of commercial interest. Pressure maxima ranging up to 8000 p.s.i. were observed. Comparison of experimental results with theoretical expressions for pressure distribution, as given by several authors, indicates that the equation derived by Gaskell quite satisfactorily predicts the results for the case of the viscous liquid. The commercial plastics were found to exhibit pressure-distribution characteristics which were perceptibly different from those of the viscous liquid. Certain limitations of Gaskell's treatment of nonviscous materials prevent its application to these experimental results.

NEW FORMING METHODS EXPAND USE OF POLYETHYLENE PLASTICS. K. Rose. Materials & Methods *34*, 88-91 (Oct. 1951). A modified casting technique, a new welding method, and procedures for applying coatings of polyethylene are described. Tubing is made by a spin casting process. Valves, pipe fittings, ducts, and jugs are made by a modified gas welding method. Coatings are flame-sprayed.

Properties

TROPICAL PERFORMANCE OF FUNGICIDAL COATINGS. J. M. Leonard and A. L. Pitman. Ind. Eng. Chem. *43*, 2338-41 (Oct. 1951). One aspect of the moisture- and fungus-proofing of military electronic equipment is the application of organic coatings. These coatings were developed and specified with little knowledge of their merits under conditions of end use. The toxicities to fungi of approximately one hundred different toxic agents dispersed in varnish and lacquer vehicles were studied by the exposure of coated cotton-braid wires in a tropical jungle. The results indicate that most toxicants are inadequate, especially at the concentrations now employed. Variance analysis of a portion of the data permits estimations of the influences of the variables considered singly and in combination; and it yields information that will be especially useful in experiments conducted in the future.

STUDY OF THE OXIDATIVE DEGRADATION OF POLYVINYL FORMAL. H. C. Beachell, P. Fotis, and J. Hucks. J. Polymer Sci. *7*, 353-76 (Oct. 1951). The oxidative degradation of polyvinyl formal at temperatures of 150° C. and above was followed by changes in the infrared spectrum in conjunction with the loss in weight and color development. It is a complex process of cross-linking and oxidation, rather than one of depolymerization. The infrared spectrum shows rapid development of carbonyl and ethylenic groups in the molecule, accompanied by loss of carbon-hydrogen and formal groups. A free radical mechanism for the rupture of the formal ring is proposed, which explains the loss of formaldehyde and water from the polymeric molecules and the production of carbonyl and ethylenic groups in the chain that are capable of producing color. The stability of polyvinyl formals of various compositions is compared and the effects of residual acetate and alcohol groups on the rate of degradation are discussed. Several catalysts and inhibitors for the process are also presented.

Applications

DEVELOPMENT OF SYNTHETIC RESIN ADHESIVES FOR IMPROVED WOOD. II. CAST PHENOLIC ADHESIVES. L. K. Dalton, J. S. Fitzgerald, G. W. Tack, and N. Tamblyn. Australian J. Applied Sci. *2*, No. 1, 156-74 (1951). Cool-setting phenol-formaldehyde adhesives of the acid-cured, cast resin type attacked natural wood causing severe loss of strength during 6 months' exposure to alternating conditions of heat and humidity. There was no evidence of such damage with resin-impregnated laminated wood, and with compressed laminated wood it was slight. Of the catalysts used, sulfuric acid caused the most, and hypophosphorous acid the least damage to natural wood. The highest concentration of each catalyst used (3% for toluenesulfonic acid) gave the highest bond strength with resin-impregnated laminated wood but caused the greatest reduction in strength with mountain ash. Substitution of resorcinol for 5% or more of the cast phenolic resin increased joint strengths with all materials bonded, and lessened damage to natural wood by permitting the use of lower concentrations of acid catalyst.

PLASTICS IN BUILDING — XI. J. B. Singer. Plastics (London) *16*, 262, 261 (Sept. 1951). Plastic pipes and translucent sheets and concrete reinforced with polyvinyl chloride and glass fibers are described.

MINIATURIZING WITH PLASTICS. Brit. Plastics *24*, 302-7 (Sept. 1951). The miniaturizing of electronic components with casting resins is described. The properties of polyester, phenolic, and epoxy resins used for this application are given. Various applications are described.

Testing

SOME RECENT OBSERVATIONS IN MICRO-HARDNESS TESTING. E. B. Bergsman. ASTM Bull. No. 176, 37-43 (Sept. 1951). Some of the factors responsible for lack of agreement of results in micro-hardness testing are examined, including the influence of indentation speed, the length of the contact period, shocks, vibrations,

and the specimen preparation. A question of primary importance is the calibration of the measuring devices. One method of calibration, using a specially made optical grating, is described. The calibration factor can vary over the range of measurements. The main part of the paper is devoted to the load dependence of the hardness number.

METHODS OF RATING FILM DURABILITY. D. W. Flierl. Modern Packaging *25*, 129-31, 197-8 (Nov. 1951). Methods for determining the flex life, impact strength, and tear strength of organic polymers in film form are described. Results obtained with regenerated cellulose film are reported.

ATTEMPTED EVALUATION OF PHENOLIC MOLDINGS BY PENETRATION. S. W. Hargreaves and J. H. Martin. Brit. Plastics *24*, 321-5 (Sept. 1951). The degree of cure of phenolic plastic moldings is determined by a hot-needle penetration test. The results are evaluated by comparison with the results of acetone extraction, impact strength, and tensile strength tests.

APPARATUS FOR COMPARING THE STABILITIES OF POLYVINYL CHLORIDE LATICES. H. G. Drinkwater and N. Payne. Chem. & Ind. *1951*, 683-4 (Aug. 11, 1951). The stability of polyvinyl chloride latices toward addition of electrolyte solutions is discussed. Manual test methods and the use of an electrically-stirred device are compared. This apparatus gives a well defined end point and is described and illustrated.

AN ELECTRON-MICROSCOPE STUDY OF PLASTICIZED NITROCELLULOSE. J. Ames and A. M. D. Sampson. J. Applied Chem. *1*, 337-41 (Aug. 1951). The surface of films of a) castor oil plasticized, b) dibutyl phthalate plasticized, and c) unplasticized cellulose nitrate were examined in the electron microscope, using an atomic-replica technique. The castor oil-cellulose nitrate plastic was relatively granular in texture, whereas the others were almost structureless. No evidence of the presence of plasticizer could be obtained, and it is concluded that the degree of dispersion of the plasticizer is finer than the resolving limit of the microscope. Some possible plasticization mechanisms are discussed on the basis of the observations made.

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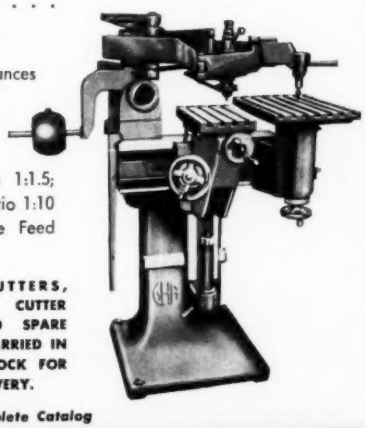

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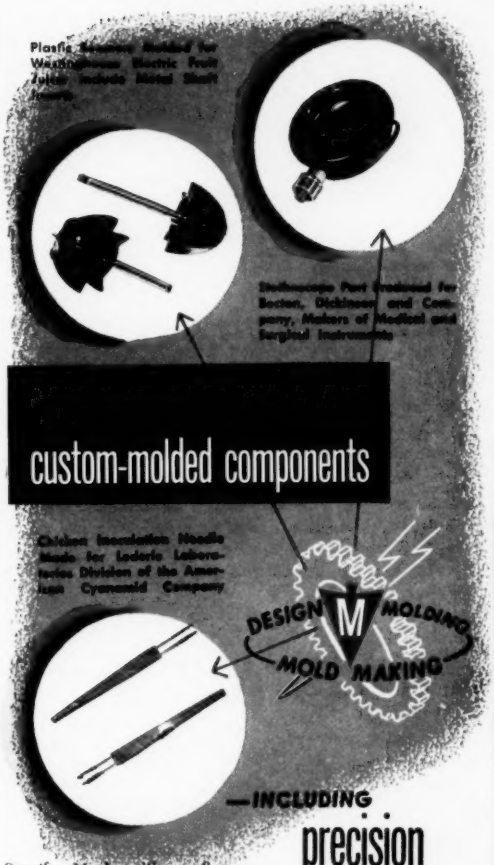

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POLYMERIZATION. A. P. Dunlop and P. R. Stout (to Quaker Oats). U. S. 2,570,027, Oct. 2. Process for polymerizing furfuryl alcohol with acid catalyst.

RESIN. A. P. Dunlop and P. R. Stout (to Quaker Oats). U. S. 2,570,028, Oct. 2. Ammonium thiocyanate-partially resinified furfuryl alcohol resins.

RESIN. M. L. A. Fluchaire and G. Collardeau (to Societe des Usines Chimiques Rhone-Pouleuc). U. S. 2,570,029, Oct. 2. Allyl esters of 3:6 - endexo - 1:2 - cyclohexane - dicarboxylic acid and polymers thereof.

POLYMERIZATION. P. Halbig. U. S. 2,570,056, Oct. 2. Emulsion polymerization of vinyl halides.

COPOLYMERS. A. J. Barry and J. W. Gilkey (to Dow Corning). U. S. 2,570,090, Oct. 2. Carboxyphenyl polysiloxane polyhydric alcohol copolymers.

RESINS. H. W. Bradley (to Du Pont). U. S. 2,570,094, Oct. 2. Alkylolamine and morpholine salts of polymerized olefin sulfonic acids.

POLYAMIDES. A. L. Allwelt (to American Viscose). U. S. 2,570,180, Oct. 9. Fluorinated long chain polyamides.

CELLULAR MATERIAL. L. E. Daly and R. W. Pooley (to U. S. Rubber). U. S. 2,570,182, Oct. 9. Cellular composition of vinyl plastisol and a synthetic rubber.

SILOXANE. P. H. Aldrich (to Minnesota Mining). U. S. 2,570,185, Oct. 9. Alkoxysilane-amine asphalt additive.

ACRYLONITRILE. H. A. Bruson (to Industrial Rayon). U. S. 2,570,200-1, Oct. 9. Coagulating acrylonitrile polymer in ethylene carbonate and tripropylene glycol.

ACRYLONITRILE. G. S. Hooper and G. A. McFarren (to Industrial Rayon). U. S. 2,570,237, Oct. 9. Spinning of acrylonitrile polymers.

ACRYLONITRILE. G. A. McFarren (to Industrial Rayon). U. S. 2,570,257, Oct. 9. Spinning acrylonitrile polymers.

COPOLYMERS. E. E. Parker (to Pittsburgh Plate Glass). U. S. 2,570,269, Oct. 9. Stabilization of copolymerizable polyester-monomer mixture by means of a substituted hydrazine.

MOLDING. L. L. Stott and E. E. Montross (to Polymer Corp.). U. S. 2,570,284, Oct. 9. Equipment for molding elongated articles from plastic materials.

RESIN. C. F. Schrimpe (to Carbide and Carbon). U. S. 2,570,389, Oct. 9. Condensing acetone with formaldehyde in presence of secondary amine.

MOLDING. H. M. Dodge (to General Tire and Rubber). U. S. 2,570,433, Oct. 9. Injection molding machine.

PHENOLIC RESINS. H. S. Block (to Universal Oil Products). U. S. 2,570,513, Oct. 9. Reacting a mixture of mono' and poly-alkenyl phenols with an aldehyde or ketone.

RESINS. L. Schmerling (to Universal Oil Products). U. S. 2,570,601, Oct. 9. Production of resins from butadiene monoxide and vinyl compounds.

MOLDS. L. W. Vinal (to Du Pont). U. S. 2,570,613, Oct. 9. Degating device for plastic molds.

RESINS. T. R. E. Kressman (to Permutit). U. S. 2,570,822, Oct. 9 Polyalkylene polyamine-formaldehyde anion exchange resin.

HEAT-SEALABLE FILM. E. M. Maxey and C. P. Krupp (to B. F. Goodrich). U. S. 2,570,829, Oct. 9. Heat-sealable film comprising a rubbery polymer of a conjugated diolefin with an alpha-methylene nitrile and polyvinyl chloride.

POLYMERS. M. J. Roedel (to Du Pont). U. S. 2,570,861, Oct. 9. Polymeric methoxymethyl methacrylate.

INTERPOLYMERS. R. J. Wolf (to B. F. Goodrich). U. S. 2,570,900, Oct. 9. Interpolymers of vinyl chloride, vinyl aromatic ester, and a higher alkyl acrylate.

PLASTIC TUBING. F. V. Collins (to W. F. Stahl). U. S. 2,570,921, Oct. 9. Forming thermoplastic tubing with the aid of high frequency heating.

RESINS. J. T. Goodwin (to Dow Corning). U. S. 2,571,029, Oct. 9. Composition of butylated melamine-formaldehyde resin and a resinous reaction product of phenylmethylsiloxane, monophenylsiloxane, glycerol, and phthalic anhydride.

RESINS. J. F. Hyde (to Dow Corning). U. S. 2,571,039, Oct. 9. Siloxane elastomers comprising a modified acid polymer and a filler.

LIQUID RESIN. M. T. Harvey (to Harvel Research). U.S. 2,571,089, Oct. 16. Liquid resin comprising maleic, fumaric, or like acid dissolved in acetone-formaldehyde resin.

RESINS. M. DeGroote and B. Keiser (to Petrolite). U.S. 2,571,117-8-9-20-1, Oct. 16. Oxyalkylated derivatives of carboxyl-containing xylene-soluble phenol-aldehyde resins.

MOLDING. N. O. Broderson (to Rochester Button). U.S. 2,571,193, Oct. 16. Molding plastic articles of variegated color.

AMINO RESINS. J. E. H. Hayward and P. H. Calderbank (to Carbide and Carbon). U.S. 2,571,240, Oct. 16. Incorporating in an amino resin condensate a glycerol or pentaerythritol reacted with a phenol or alcohol.

POLYMERS. W. D. Jones (to Celanese). U.S. 2 571,251, Oct. 16. Production of a polymer comprising condensing a sulfone divaleric acid and 1.9-diamino-5-azononane in solution in *m*-cresol.

CASTING COMPOSITION. M. C. Dailey and E. W. Duffy (to U.S. Gypsum). U.S. 2,571,343, Oct. 16. Self setting composition of gypsum hemihydrate and aminotriazine-aldehyde resin.

POLYMERIZATION. C. M. Fontana (to Socony-Vacuum Oil). U.S. 2,571,354, Oct. 16. Polymerization of monoalkylethylenes.

TAPE. T. Martin (to Hunter-Doug-

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las). U.S. 2,571,372, Oct. 16. Plastic venetian blind tape.

PRINTING PLATES. B. Wells. U.S. 2,571,397, Oct. 16. Preparation of printing plates from casting resin.

SPRAY BOTTLE. R. P. Vuillemenot (to Pharma-Craft). U.S. 2,571,504, Oct. 16. Thermoplastic spray bottle for cosmetics.

BOOKBINDING. A. Blitstein. U.S. 2,571,525, Oct. 16. Manufacturing books from a permanent thermoplastic material with a high frequency heating device.

RESINS. E. C. Britton and H. C. White (to Dow). U.S. 2,571,533, Oct. 16. Heat-hardening silicone resin containing an alkaline reacting agent.

JOINTING. J. T. G. Milne (to Electric and Musical Industries). U.S. 2,571,599, Oct. 16. Radio-frequency heating apparatus for joining plastic materials.

RESIN COMPOSITION. H. W. Coover, Jr., and J. B. Dickey (to Eastman Kodak). U.S. 2,571,683, Oct. 16. Mixtures of polyacrylonitrile and a polyvinyl acetal.

SCRAP RECLAMATION. H. I. Davis (to Eastman Kodak). U.S. 2,571,686, Oct. 16. Recovering scrap cellulose ester by subjecting to surface hydrolysis with alkali and then treating with an aluminum salt.

COPOLYMERS. J. B. Dickey and J. G. McNally (to Eastman Kodak). U.S. 2,571,687. Oct. 16. Copolymers of difluoracrylic acid esters.

COLLOIDS. K. C. Rathbun (to Eastman Kodak). U.S. 2,571,760. Oct. 16. Apparatus for forming colloidal suspensions of plastic materials.

RESIN. D. D. Reynolds and W. O. Kenyon (to Eastman Kodak). U.S. 2,571,761, Oct. 16. Reacting tertiary amines with polyvinyl esters.

MOLDING. T. Saulino, U.S. 2,571,766, Oct. 16. Injection molding apparatus.

POLYMERS. T. E. Stanin and J. B. Dickey (to Eastman Kodak). U.S. 2,571,777, Oct. 16. Acrylonitrile polymer mixed with copolymer of vinyl acetate and isopropenyl acetate.

POLYMERS. G. E. Hulse (to Hercules). U.S. 2,571,883, Oct. 16. 2-Methylene-1,3-propylene dichloride homopolymer.

RESIN COMPOSITION. R. G. Newberg (to Standard Oil). U.S. 2,571,928, Oct. 16. Resinous compositions of a styrene-isoolefin copolymer and a vinyl polymer.

PRINTING. L. H. Smith and F. M. Smith (to Decora). U.S. 2,571,962, Oct. 16. Decorative printing of polyvinyl chloride sheets.

FURAN RESINS. B. Thomas (to Delrac). U.S. 2,571,994, Oct. 23. Furfural-furfuryl alcohol resin.

COATED PARTICLES. A. Sommer (to Impact Mixing). U.S. 2,572,068, Oct. 23. Coating plastic particles.

RESINS. A. D. F. Toy (to Victor Chemical). U.S. 2,572,076, Oct. 23. Aromatic phosphorus-containing resins.

RESINS. H. Wittcoff and J. R. Roach (to General Mills). U.S. 2,572,085, Oct. 23. Ester reaction product of a polybasic acid, soy fatty acid, and a polymeric polyalcohol.

COPOLYMERS. H. D. Noether and E. P. Irany (to Celanese). U.S. 2,572,185. Oct. 23. Copolymers of sulfur dioxide and styrene.

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Heating Capacity—Electrode area of 10" by 12" will accommodate preforms up to 3¾" thick. (Special electrodes to provide larger heating area available.)

Controls—Controls on front of cabinet include electrode height adjusting knob, plate ammeter, grid meter, grid adjustment knob, timer, and main circuit breaker.

Construction—Heavy gauge aluminum cabinet contains built-in material-heating compartment with electrode and preform handling tray.

Dimensions and Weight—21" wide, 24" deep, 53¾" high. Weight: 925 pounds gross, 800 pounds net.

THE GIRDLER CORPORATION
Thermex Division

(to Raytheon). U.S. 2,572,226, Oct. 23. Welding thermoplastic materials with application of radio frequency energy.

ELASTOMERS. E. L. Warrick (to Dow Corning). U.S. 2,572,227, Oct. 23. Polymerizing polysiloxanes with tertiary butyl peracetate catalyst.

BOOKBINDING. F. J. Cashin and H. W. Wolf (to DeFlorez). U.S. 2,572,-243, Oct. 23. Pressure applicator for plastic bindings of hard cased books.

UREA RESINS. P. J. Garner and R. E. Bowman (to Shell). U.S. 2,572,-256, Oct. 23. Transparent urea-aldehyde resins.

POLARIZER. J. E. Campbell (to Polaroid). U.S. 2,572,315, Oct. 23. Transparent dichroic light-polarizing sheet of molecularly oriented polyvinyl chloride containing oriented dehydrohalogenated polyvinyl chloride.

REINFORCED PLASTIC. P. A. Talet and P. Cor (to Societé Nobel Francaise). U.S. 2,572,407, Oct. 23. Degreasing glass fiber, treating with acid, impregnating with polyvinyl alcohol, forming the fiber into a sheet, coating with polyvinyl alcohol, and finally treating with formal and sulfuric acid.

NITROPOLYSTYRENE. H. Zenftman and A. McLean (to Imperial Chemical Industries). U.S. 2,572,420, Oct. 23.

STYRENE RESINS. J. M. Butler (to Monsanto). U.S. 2,572,557-8, Oct. 23. Mineral oil compositions containing reaction products of polystyrene and an alkyl ester of an unsaturated acid.

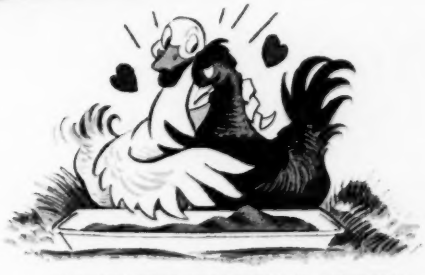
CELLULOSE ETHERS. J. P. Chittam (to U.S. Rubber). U.S. 2,572,559, Oct. 23. Adding to cellulose ethers sodium dichromate and tetrachloro-p-benzoquinone, molding, and heating to cure.

COPOLYMERS. G. E. Ham (to Monsanto). U.S. 2,572,560-1, Oct. 23. Copolymers of acrylonitrile and quaternary ammonium salts containing vinyl allyl or methallyl substituents.

POROUS COMPOSITION. E. W. Gluesenkamp (to Monsanto). U.S. 2,572,-568, Oct. 23. Porous plastic prepared with substituted carbamyl amino acid as blowing agent.

VINYL RESINS. P. E. Marling (to Monsanto). U.S. 2,572,571, Oct. 23.

CAN BE USED AS AN EXTENDER



IS COMPATIBLE WITH OTHER PLASTICIZERS

One of the important properties of *S/V Sovaloid C*—Socony-Vacuum's versatile plasticizer for vinyl resins and nitrile rubbers—is that *it won't migrate* from your finished products. But it also has many other processing advantages! For example . . .

Saves Up to 90%

S/V Sovaloid C is completely compatible with all vinyl and nitrile rubber compounds, and is well suited to plastisol formulations. It gives good flexibility, excellent oil resistance and high tensile strength. And it is still the most economical plasticizer available for vinyl resins—*can save you from 30 to 90 per cent* of plasticizer cost when used to extend more expensive ester-type plasticizers! Ask your Socony-Vacuum man about S/V Sovaloid C!

Process Products
SOCONY VACUUM

SOCONY-VACUUM
Process Products

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

Vinyl chloride resins stabilized with an aromatic phosphite.

RESIN. D. T. Mowry and R. B. Seymour (to Monsanto). U.S. 2,572,572, Oct. 23. Copolymer of styrene and ar-cyclohexyl-styrene.

PHONOGRAPH RECORD. J. W. Ayers (to Agrashell). U.S. 2,572,798, Oct. 23. Phonograph record made of vinyl resin and lignocellulose.

POLYMERS. R. N. MacDonald (to Du Pont). U.S. 2,572,842, Oct. 30. Polymers of the N-carboanhydride of 2-amino-4,6,6-trimethylheptanoic acid.

POLYMERS. R. N. MacDonald (to Du Pont). U.S. 2,572,843-4, Oct. 30. Linear polymeric alpha-amino-carboxylic acid polyamides from spiro-N-carboanhydrides.

POLYMERIZERATION. J. B. Rust and C. A. MacKenzie (to Montclair Research and Ellis-Foster). U.S. 2,572,876, Oct. 30. Polymerization of an alkoxy hydrocarbon silane by oxidation.

ADHERING VINYL SURFACES. T. C. Morris and E. C. Johnson (to B. B. Chemical). U.S. 2,572,877, Oct. 30. Coating a surface of waterproof plasticized vinyl resin with butadiene-acrylonitrile to render it capable of being adhered.

BONDING. T. C. Morris and E. C. Johnson (to B. B. Chemical). U.S. 2,572,879, Oct. 30. Cold bonding plasticized resin sheets to other sheets.

POLYMERS. K. M. Gaver, E. P. Lasure, and D. V. Tieszen (to Ohio State Univ.). U.S. 2,572,923, Oct. 30. Gluco-pyranose polymers.

HOLLOW PLASTIC. D. Gonda (to Holoplast). U.S. 2,572,924, Oct. 30. Structural unit comprising panel-like portions interconnected by spaced webs.

POLYMERS. R. H. Helle (to American Viscose). U.S. 2,572,931, Oct. 30. Cellular acrylonitrile polymers.

TRANSPARENT PANEL. P. Pevney (to Republic Aviation). U.S. 2,572,947, Oct. 30. Resin-bonded safety glass.

COPOLYMER. M. J. Roedel (to Du Pont). U.S. 2,572,951, Oct. 30. Coating containing a copolymer of styrene and beta-allyloxyethyl acrylate.

DECALCOMANIA. M. Axelrod (to Axelgate). U.S. 2,572,967, Oct. 30. Plastic decalcomania for wrinkle-finished surfaces.

MOLDING. E. R. Byers (to B. F. Goodrich). U.S. 2,572,984, Oct. 30. Apparatus for ejecting articles from molds.

EXTRUSION. C. D. Orsini (to Nixon Nitration). U.S. 2,573,050, Oct. 30. Method of extruding plastic rods having a spiral design.

LOOM PICKER. I. H. Porth (to U.S. Rubber). U.S. 2,573,273, Oct. 30. Loom picker formed of molded vulcanized butadiene-acrylonitrile and which contains a high-styrene styrene-butadiene and also fibrous nylon.

EXTRUSION. G. E. Henning (to Western Electric). U.S. 2,573,440, Oct. 30. An apparatus for the working and also the extruding of plastic material.

RESIN. A. Rheiner and H. M. Hemmi (to Sandoz). U.S. 2,573,489, Oct. 30. Formaldehyde dicyandiamide polyhydroxypropylene-polyamine reaction product.

NEW MACHINERY AND EQUIPMENT

CONTINUOUS MILL—A heavy duty continuous ball or tube mill with improved features to eliminate costly shutdowns and reduce maintenance expenses to a minimum has been developed by the Patterson Foundry and Machine Co., East Liverpool, Ohio. The machine, which is adaptable to fine or coarse grinding, wet or dry grinding, and open or closed circuit grinding, may be used for pulverizing chemical raw materials, ceramic raw materials, minerals, and numerous finished products. Cast steel mill heads, slightly conical in shape to provide maximum strength with minimum weight, are bolted onto a flange ring on the welded steel mill shell. Perfect alignment is assured by a matching recess and a shoulder which relieves the bolts of the load carrying strain. The mill shell is drilled to allow easy installation of the replaceable linings.

The mill is driven through a heavy "T" section girth, or ring gear. Using a full depth 20° pressure angle involute tooth form, the gear is said to be the most modern design for open gear operation, with a maximum allowance for wear and tooth strength. The main mill bearings are large and rigid, with various bearing materials, such as heavy duty babbit, fabric plastic sleeves, or replaceable bronze sleeves, available for different applications. An oil-circulating system continually flushes dirt and grit from the bearings. Machine sizes available range from a mill 2 ft. dia. by 2 ft. long, to one that is 10 ft. dia. by 24 ft. long.

PORTABLE SLIDING DRAWER OVEN—A new model in the line of portable electric ovens designed to speed up production and cut handling costs where parts or materials require pre-heating, drying, or baking, is now being manufactured by Grieve-Hendry Co., Inc., 1101 North Paulina St., Chicago 22, Ill. This latest model has eight drawers that permit baking different materials at the same time or inserted at intervals. High temperature strip heaters provide efficient heating. Features of the ovens include: temperature control by thermostat adjustable to 325° F.; 118 lb. light weight construction, allowing easy movability; forced circulation by fan driven by electric motor; and an adjustable damper to control volume of air circulation. The ovens can be used in a group or battery or stacked one on top of the other. They may be provided with outside reading thermometers, red pilot light to show when heating elements are on, and an exhaust chamber adapter for venting off fumes. The outside dimensions of the oven are 30 in. wide by 25 in. deep by 24 in. high. Each of the eight drawers of the oven measures 2 in. high by 11½ in. wide by 23 in. deep.

NYLON HOLDER—Molded of durable nylon around a ⅛-in. steel mandril insert, this new holder for felt polishing wheels is a product of the Detroit Mold Engineering Co., 6686 E. McNichols Rd., Detroit, Mich. By utilizing the centrifugal force of the felt in conjunction with the raised "beads"

along the inside diameter and bottom of the holder, a solid gripping action on the felt bob is possible. This prevents the slippage and eccentricity which are the major causes for the breaking apart of felts employing the "center-screw" type of holder. The new design also gives longer life and greater versatility to the felt because it can be re-dressed right down through the axis without running into the center shaft. The holders are available in three standard sizes, ¼, ½, and ¾ in., and come packed in a neat transparent plastic container with a hinged top.

MINING MACHINERY—A new line of intensive mixers for use in processing many materials has been announced by Stewart Bolling and Co., Inc., 3190 East 6th Street, Cleveland 27, Ohio. The machine's exclusive features include: patented spiral-flow temperature transfer sides, through which the material can be heated or chilled in the same chamber with equal efficiency or economy; split end frames which provide greater holding strength and easier accessibility; dust seals; and newly designed rotors, which allow better dispersion and mixing of materials and permit close radial running clearances. The mixers also have anti-friction bearings and a cast steel discharge door. Available sizes can accommodate batches from as low as 65 lb. to as high as 450 lb., with a drive ranging from 75 to 250 horsepower.

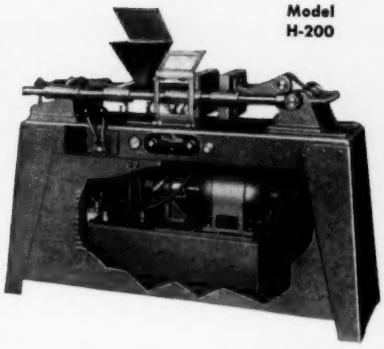
BETA RAY GAGE—Utilizing nuclear reaction as a method of quality control in the continuous measurement of sheet materials directly on the production line, the Beta Ray Gage has been made available by Industrial Nucleonics Corp., 1205 Chesapeake Ave., Columbus 12, Ohio. The machine has the advantage of non-contact with the material, is not affected by variations in composition, moisture, and color, and automatically compensates for temperature changes and other factors contributing to inaccuracies. It can accommodate a wide scope of materials ranging from steel and brass sheets to 0.030 in., rubber and plastics to approximately 0.200 in., and aluminum to 0.090 in. to paper, coated textiles, and floor coverings. Radio-active materials, carefully produced, are used in the machine, which has three components: a source of beta radiation, a radiation detector, and an indicating or recording device. As the material is run through a gap between the source and the detector, variations in weight per unit area will cause corresponding

Model H-200

SEMI-AUTOMATIC INJECTION PRESS

2-oz. capacity. Van Dorn's engineering experience has scored again with this leader among all injection presses of its class. Its ultra-modern design insures faster operating cycles—up to 6 per minute. Push button controls are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.

Model H-200



Power Operated, Lever Controlled Presses—Available in 2-oz. or 1-oz. models. These profit-makers feature: Rugged all-welded construction; built-in safety devices; heating chamber with ample plasticizing capacity.

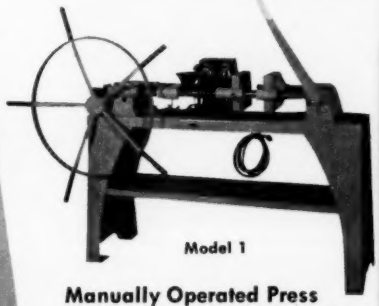
VAN DORN
Plastic Equipment

COSTS LESS to Buy...to Operate!

Van Dorn presses are *unexcelled in efficiency* and *unequalled in economy* on the innumerable jobs where a 2-oz. injection is ample. Costwise, Van Dorn presses are outstanding for these reasons:

1. **Surprisingly low in price**
2. **Operate 8 hours for a few dollars**
3. **Use less expensive molds**
4. **Easily set up by one man in a few minutes**

These presses mold practically all thermoplastics including nylon . . . Look over the Van Dorn presses and plastic equipment shown—*then write for detailed Bulletins on individual machines.*

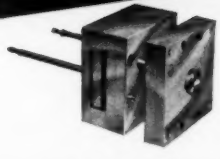


Model 1

Manually Operated Press
1-oz. capacity. Ideal for smaller jobs, experimental work, training.

Plastic Grinder
Grinds up rejects, waste, etc., for re-use. Ruggedly made, easily cleaned.

Model G-100



Mold Bases
. . . Available from stock for all Van Dorn presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO
Cable Address: "VANDORN" Cleveland

See this Van Dorn Equipment at Booth 104 of the National Plastics Exposition

changes in the ionization current produced in the detector. This is in turn transmitted to the recording indicator.

The machine is easily operated with two simple controls and all its parts, including the console, are constructed sturdily and durably. The standard unit permits measurements up to about 21 in. from the edge of the sheet; special units can be made to measure up to 48 in. from the edge.

FLEXIBLE FILE—Capable of filing any material of any profile by being bent cold to the desired shape, the new flexible Abrafile has been announced by Tec Imports, 14404 Addison St., Van Nuys, Calif. The soft core, round file—in six lengths and diameters—also features non-clogging teeth that will not fill up on lead, wood, aluminum, or plastics. Its flexibility is ideal for cleaning awkward corners, hard to reach areas, and concave surfaces.

PRECISION SANDER—A sanding machine designed to accurately finish plastic, metal, or wood surfaces to close tolerances has been developed by The Beach Mfg. Co., Montrose, Pa. The machine will feed material ranging from $\frac{1}{32}$ to 6 in. in thickness and up to 54 in. in width. Ground steel rolls located directly under the abrasive drums support the material and assure a uniformly finished surface over the entire sheet. Sizes available are 24, 30, 38, 42, 48, and 54 inches.

TRANSFER MOLDING PRESS—Available with either top or bottom plunger to suit the user's transfer molding requirements, this new high-speed press, Model No. 727, has just been announced by F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20, Pa. The press is equipped with an extra-long transfer stroke that permits complete withdrawal of the plunger from the loading area to give ample clearance for loading preforms. It is also supplied with double pumps for maximum flexibility, and since each of the cylinders has its own pump and controls, the pressures and speed of each can be controlled separately. The press also has a bar-type controller providing automatic cycle control; a three-speed controlled closing that reduces closing time of the press and eliminates po-

tential mold damage; and a double-acting ram to eliminate external pull-back cylinders. The press is available in 100- and 200-ton capacities and the specifications respectively for each of these two sizes is as follows: stroke, 12 and 15 in.; die space, 24 by 20 in. and 30 by 24 in.; closing speed, 312 and 280 in. per min.; pump, 7½ and 10 hp.; transfer cylinder capacity, 24 and 40 tons; and transfer cylinder stroke, 12 and 15 tons.

BRANDING MACHINE—A new machine for marking identification on conductors of electrical systems has been announced by the Ralph C. Coxhead Corp., 720 Frelinghuysen Ave., Newark 5, N. J. The machine is a typewriter-like device with a standard keyboard. The vinyl tubing used for wire terminal identification is clamped into position in the machine and as it is drawn along in typewriter fashion, the identifying numbers or letters are "typed" on. By employing heated type, the markings are actually heat-branded below

the surface of the tubing and become indelible and permanent. A special heating device maintains the correct temperature necessary to deposit durable leaf carbon into the brand. The type is easily changeable and permits tubing from ⅛ to ½ in. in diameter to be branded with the maximum size it can take. Type is also available in special symbols and for imprinting identifications in foreign languages.

POWER AND CONTROL UNIT—A packaged oil hydraulic power and control unit, designed for conversion of older, slow-speed hydraulic presses and extrusion machines to the higher speeds required by modern production, is now being manufactured by The Rucker Co., 4228 Hollis St., Oakland 8, Calif. These new units incorporate conventional

Why G-E rubber-phenolics mean greater serviceability

Automatic dishwasher impeller and silverware basket molded from shock-resistant G-E rubber-phenolics.

Why was a General Electric rubber-phenolic compound selected to mold these automatic dishwasher parts?

The G-E rubber-phenolic silverware basket has the required strength and resilience to withstand the continuous impact of dropped utensils and vibration of the operating dishwasher. In this case, rubber-phenolics eliminated dependence on brass and provided a lower-cost, more attractive part with longer service life.

Actual tests show that the impeller, molded from G-E rubber-phenolics, has five times the shock resistance of the conventional phenolics previously used—thus minimizing replacement problems. Such tests also indicate that the rubber-phenolic impeller retains strength properties after continuous exposure to hot water and detergents.

DESIGNERS!

Specify G-E rubber-phenolics where greater serviceability at minimum cost is required.

MOLDERS!

G-E rubber-phenolics may reduce your finishing costs, satisfy your customers, open new markets for plastics.

FOR COMPLETE DETAILS, just write to General Electric Company, Section G-2, Chemical Division, Pittsfield, Massachusetts.

You can put your confidence in—

GENERAL ELECTRIC

high-low pressure and volume construction, with a pressure compensated high pressure circuit to hold pressure cycle at the exact speeds desired. This construction enables the operator to get needed cylinder speed quickly, yet by manual controls to alter the pressing or extruding speed as the job indicates during operation. The unit includes electric controlled valving, decompression unit, micronic filters, and a large oil reservoir tank, sized to meet specific job needs. Sizes available range to 135 hp. at 5000 p.s.i.

SURFACE TEMPERATURE THERMOMETER—Designed exclusively for indicating surface temperatures, this new thermometer is a product of Pacific Transducer Co., 11921 West Pico Blvd., Los Angeles 64, Calif. The instrument may be affixed to any flat surface by either applying silicone grease, which is supplied with the thermometer, and then sticking the device in place, or by employing a small magnetic clamp, with which it is also furnished, to hold it on steel dies or other ferrous surfaces. Either securing method is satisfactory throughout all working temperature ranges.

The thermometer, 2 in. in diameter, has a range of from 0 to 300° F. calibrated in 2° increments and is insured against external radiation by a highly reflective evaporated mirror on the dial. The instrument is recommended for the following uses: checking outside temperatures of pipes, plastics dies, and rubber molds; checking external temperatures for wall leakage of refrigerators, cold chambers, and freezers; and checking the temperature of bearings, electric motors, cylinder blocks, and industrial walls, ceilings, and floors.

PLASTIC WINDER—Maintaining an absolutely constant tension, the Model 40 continuous automatic winder, recently announced by the Dilts Machine Works, Div. The Black-Clawson Co., Fulton, N. Y., is especially suited to the winding of web materials which must be wound with extremely low tension values. Such materials would include plastic film and sheeting as produced continuously from calenders, extruders, and coating equipment.

Even and uniform starts are made on the machine and no adhesive or

special processing of the core or shell is required. Rolls are changed automatically without slowing down the process. The machine itself consists of a rotatable, center wind, two arm reel with separate motors driving the winding core or shell through ball-bearing spindles. The winder drive can be added to any existing take-off without alterations. Other operational features of the machine include: controlling the amount of tension by adjusting the speed; ability to wind two diameters alternately on the cores or shells by means of a remote control selector switch; and incorporation of slitters to maintain straight edges and allow slitting into several widths. The range of the machine is as follows: maximum roll diameter, 24 in.; maximum web or ribbon width, 84 in.; maximum roll weight, 1000 lb.; maximum speed, 170 Y.P.M.; and total web tension range, 2 to 60 pounds.

HYDRAULIC LABORATORY PRESS—Especially designed for pilot run and general production in molding and laminating operations in the plastics, rubber, and wood industries, this new 50-ton press is a product of Wabash Metal Products Co., 1569 Morris St., Wabash, Ind. The press incorporates a hydraulic pump which operates at high speed to close the platens, and at slow speed to afford the needed pressure for molding and laminating and also for maintaining maximum pressure on the work in process. The hydraulic mechanism, with a 7 in. stroke, provides a total available force of 100,000 pounds. A special feature is the distinct paralleling of the electrically heated platens, available in dimensions of 12 by 15 in. and 18 by 24 in., by precision boring of the guide holes. Other specifications of the press include: maximum daylight opening of 15½ in.; maximum rate of ram travel, 18 in. per min.; heat range to 550° F.; and ¾ hp. motor. The press is available for either 115 or 230 volts A.C. operation.

A 12-ton similar press (Model 12-10) is also available. The major specifications on this model are: stroke, 6 in.; maximum daylight opening (readily adjustable), 10 in.; platen area, 7 by 10 in.; wattage (two platens), 1600; width between two columns, 11 in.; and temperature range, 0 to 600° F.

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"How to Make Professional Moulds and Castings," by Ralph Travers

Published in 1951 by Plastic Service Guild, 233 Condor St., E. Boston 28, Mass., 142 pages. Price $5.95

A review of various methods of making specialized molds, this book includes information on rubber latex molds, glue and gelatin molds, semi-rigid molds, rigid molds, and plaster molds. Also covered is the field of plaster casting, embedment of specimens, carving of plastics, and phenolic casting resins. Several chapters offer data on catalysts and accelerators, lubricants, colors, and fillers.

"Technical Libraries, Their Organization and Management"

Published in 1951 by Special Libraries Assoc., 31 East Tenth St., New York 3, N. Y. 200 pages. Price $6.00

Based on the experience of librarians in private industry, universities, government agencies, and research laboratories, this handy guidebook offers a practical picture of how technical libraries work. In addition to evaluating the benefits of such a service, this illustrated book presents many tested and time-saving methods for economically setting up facilities and maintaining an efficient operation.

"Industrial Water Pollution," by R. S. Aries and Associates

Published in 1951 by Chemonomics, Inc., 400 Madison Ave., New York 17, N. Y. 142 pages. Price $5.00

Regulations on water pollution now in effect in each state are listed and thoroughly discussed in this handbook. The various definitions of water polution formulated by each state are given, together with the measures necessary to comply, the enforcement procedures enumerated in the laws, and the steps which must be taken by manufacturers to abate water pollution. The Federal Standard is discussed in detail, since it serves in many cases as the model for existing or contemplated water pollution regulations. The water standards of interstate agencies are included, as well as a complete list of all state agencies concerned with water pollution.

"A Guide to Plastics," by Dr. C. A. Redfarn

Published in 1951 by Iliffe and Sons, Ltd., Dorset House, Stamford St., London, S.E.1. 112 pages. Price 7/6d

Intended for use by students and those interested in learning more about the commercial development of the plastics industry, this book sets out to explain exactly what plastics are and how plastic goods are made. Plastics nomenclature, the manufacture of plastic materials, the fabrication of plastics, and the properties of plastic products are all covered. Special features are a series of colored charts showing all the stages of manufacture, from raw material to finished goods, in each of the main categories of plastics, and line drawings showing each individual operation in the molding of an article.

"National Fire Codes. Vol. 1."

Published in 1951 by National Fire Protection Assoc., 60 Batterymarch St., Boston 10, Mass. 800 pages. Price $4.00

More than 50 standards for safeguarding of life and property against fire and explosion hazards of flammable liquids, gases, chemicals, and explosives are offered in this handbook, which covers storage and handling of gasoline and liquefied petroleum gases; new tables of properties of flammable liquids; data on new solvents; oil and gasoline burning equipment; utilization of flammable liquids; and flash point tests. The volume has been revised to include all changes made up to Sept. 6, 1951.

"Handbook of Dangerous Materials," by N. Irving Sax

Published in 1951 by Reinhold Publishing Corp., 330 West 42 St., New York 18, N. Y. 848 pages. Price $15.00

Covering over 5000 hazardous industrial materials, this handbook offers information of value to those concerned with safely handling, storing, or shipping chemicals and other dangerous items. The materials are alphabetically arranged, cross-referenced, and indexed. The data on each includes: maximum allowable concentration; toxicity; flammability; storage and handling; physical properties; formulas; and shipping regulations. Wherever possible, detailed information is offered on symptoms and antidotes, personnel safety precautions, and fire extinguishing agents. A special feature of the handbook is the complete text of the Interstate Commerce Commission Shipping Regulations, with detailed instructions on labelling, packaging, storage, and shipping. In addition, general information on explosives, fungus infections, and radiation safety is offered.

"Laminated Plastics," by G. S. Learmonth

Published in 1951 by Leonard Hill, Ltd., 17 Stratford Place, London, W.1. 268 pages. Price 25s

The materials, methods, and products of that part of the plastics industry in Britain which deals with the formation and use of laminated sheets, tubes, and fully molded articles are surveyed in this illustrated book. Topics include impregnation and drying; pressing and molding; post-forming; and testing. Chapters are also devoted to discussions of phenolic and amino resins, silicones, polyesters, fillers, and various applications. More than twenty tables cover information ranging from properties of fibers and laminates to printing matrices. Special features are a glossary of terms, an extensive bibliography, and a directory of suppliers of laminates.

Bakelite and Vinylite plastics—An easy-to-use ready reference file, this 8-page booklet covers in abridged form the company's range of special and general purpose Bakelite and Vinylite plastics. Illustrated with photos of finished products employing the materials, each of more than 50 plastics made by the company is listed, together with information on the specific properties of each, its particular industrial or commercial applications, and its ability to be molded, extruded, calendered, or otherwise formed in manufacturing processes. The information has been organized under the following headings: molding and extrusion materials; flexible film and sheeting;

protective coating resins; rigid sheets; calendering resins; and laminating, bonding, and adhesive resins. *Bakelite Co., Div. Union Carbide and Carbon Corp., 300 Madison Ave., New York 17, N. Y.*

Vinyltrichlorosilane and vinyltriethoxysilane—Full information on the physical properties, typical reactions, applications, and availability of both vinyltrichlorosilane and vinyltriethoxysilane are presented in this 4-page technical data sheet. Both compounds are described as opening new areas of research in protective coatings, plastics, textiles, elastomers, and chemicals due to their unique property of dual reactivity—reactions through the vinyl double bond and formation of polysiloxanes from the silane radical. *New Products Dept., Linde Air Products Co., Div. Union Carbide and Carbon Corp., 30 East 42 St., New York 17, N. Y.*

Hydraulic drill unit—The company's models Nos. 19-150 and 19-400 hydraulic drill units for drilling, reaming, tapping, chamfering, centering, and many other uses, are fully described in this 12-page catalog. The units are illustrated in actual plant operation. Schematic drawings of internal construction, together with complete specification listings of both units, are presented. *Rockwell Mfg. Co., Delta Power Tool Div., 600 East Vienna Ave., Milwaukee 1, Wis.*

Map paper—An attractive folder containing a sample of government map paper taken from a commercial run in a paper mill, this direct mail piece is designed to illustrate an important end use for wet-strength resins. A chart compares specifications with "off the machine" test results. *Hercules Powder Co., Paper Makers Chemical Dept., Wilmington, Del.*

Fans and blowers—Listing a line of fans and blowers, ranging from exhaust, ventilating, and kitchen fans to pressure, belted, and volume blowers, this company catalog offers complete information on each product, together with suggestions for possible applications. *Standard Electric Co., West Berlin, N. J.*

Lucoflex—Possessing outstanding thermal, chemical, and physical properties, Lucoflex, a rigid polyvinyl chloride plastic, is described in this 15-page technical data bulletin. Both tables and charts give the characteristics of the material—mechanical and electrical properties, nonflammability, and chemical and heat resistance. One section is devoted to the available forms of Lucoflex, its sheet and tubing dimensions, and reports on its adaptability to a variety of fabrication processes. Applications of the material and the industries presently making use of it are listed. *American Lucoflex, Inc., 1 East 57 St., New York, N.Y.*

Insulating materials—The various types of electric insulating materials produced by the company are described in this 8-page bulletin. Tabular data list the properties of varnishes, Glyptal alkyd resin insulating finishes, varnished cloths and tapes, sealing and filling compounds, and silicone insulating materials. There is also a concise report, with accompanying photographs, on the possible applications of each. *Chemical Div., General Electric Co., Pittsfield, Mass.*

Synthetic fibers—Profusely illustrated with picture stories and photographs of actual applications, this 32-page booklet presents a comprehensive study of the position of the company's five synthetic fibers in our daily living. Particularly emphasized are the fibers' impact on America's living patterns, their many advantages, and their growing use in both consumer and industrial fields. The fibers covered are rayon, acetate, nylon, Orlon, and Dacron. *E. I. du Pont de Nemours and Co., Inc., Wilmington, Del.*

Labels—This 24-page catalog offers a complete line of labels now being manufactured by the company. Profusely illustrated with photographs, the catalog also includes the available line of labeling devices, as well as new developments in the labeling of plastics. *Ever Ready Label Corp., 357 Cortlandt St., Belleville 9, N. J.*

Boxes—Illustrated with diagrams of products in plant operation, this 10-page booklet offers information on the company's wirebound pallet boxes. Three ways for using the boxes to cut costs in handling, storing, or shipping of materials are suggested. A special section illustrates the story of how design engineering can substantially reduce shipping weight and packing time. *General Box Co., 500 North Dearborn St., Chicago 10, Ill.*

Product designers—For use by those manufacturers who sell to the original-equipment market, this handbook is entitled "What Product Designers Want to Know About: Materials, Finishes, and Components." Research by the company has shown that product designers have difficulty in finding information that leads them to the product they want, and the handbook is aimed at helping sellers overcome that difficulty. The book contains checklists of information that designers claim they need and also includes examples of catalogs they found helpful. *Sweet's Catalog Service, 119 West 40 St., New York 18, N. Y.*

Measuring equipment—This 80-page catalog offers a summation of the company's line of testing and measuring equipment for laboratory and production line use. Each product is individually described, and uses, features, specifications, and prices are listed. The catalog also gives references to other company bulletins describing each device in more detail. *General Electric Co., Schenectady 5, N.Y.*

Patents—Written in the language of the layman and designed for use by inventors, supervisory and technical employees, and students of chemistry and engineering, this 44-page handbook covers such topics as recognizing an invention; keeping proper records; protecting inventions; and the benefits to be derived by the employee and a company from inventions and patents. Sections are devoted to the proper way to read a patent, interference and prosecution of patents, the set-up of a typical patent department, and a check list to be followed for protecting patent rights. A 4-page pictorial section follows the progress of an invention from idea to patent. The handbook is available for $3.00 from *Chemonomics, Inc., 400 Madison Ave., New York 17, N.Y.*

Conservation—Conservation of styrene plastic molding powder is the theme of this 9-page technical service bulletin which contains a systematic outline to serve as a con-

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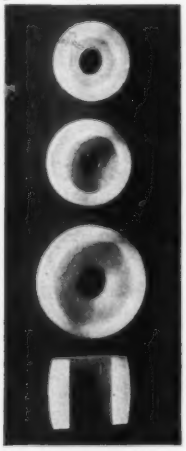

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Pictured are 3 Sinko Nylon cabinet rollers and a drawer skid-block that are being used successfully by several leading manufacturers of fine kitchen equipment. Sinko Nylon was selected after a series of exhaustive tests had proven its superiority in every respect. In one experiment a small drawer equipped with Sinko Nylon rollers was loaded and automatically operated the equivalent of a normal 200 years service. Upon examination the Sinko Nylon rollers showed little sign of wear.

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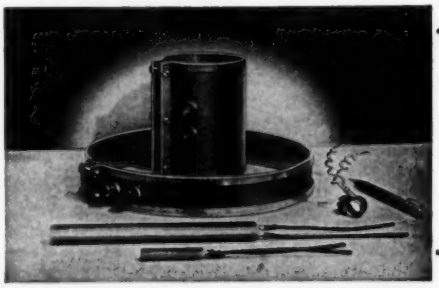

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servation check list by molders and extruders. Also covered are proper material selection, material storage, scheduling mold design, mold techniques, degating, scrap segregation, and employee education. A reference list covers additional sources of information on these subjects. *Monsanto Chemical Co., Plastics Div., Springfield, Mass.*

Metal stitching—This 12-page booklet describes and illustrates the technique, advantages, and limitations of the metal-stitching method of fastening metals to metals and metals to non-metals with high-tensile strength wire stitches. Types of stitches and typical sections that can be stitched are detailed; tabular data provide information on physical features such as standard wire sizes, strengths, ductility, finishes, and tolerances. A spread of photo-illustrated case histories presents economics based on labor and material savings and production increases. *Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.*

Hot-spray lacquer—The advantages of hot-spray lacquers and a report on their growing use and application, particularly in the military services, are offered in this leaflet. Special attention is paid to the question of cost comparison as related to the use of hot-spray versus conventional lacquer. *Hercules Powder Co., Cellulose Products Dept., Wilmington, Del.*

Metal detector—Designed for the inspection of thin sections of chewing gum, record compounds, rubber products, and the like, a new device made by RCA is capable of indicating the presence of metallic particles as small as 0.039 in. in diameter. This 4-page catalog, available from the distributor, includes a line drawing of the detector with all dimensions and a list of specifications. *Eriez Mfg. Co., Erie, Pa.*

Production control systems and procedures—Designed as an aid toward effective and economical production control, this 56-page book details a method of materials control that results in a shorter planning cycle and speedier production by eliminating the causes of varied line delays. Fully illustrated with typical forms and charts, the book outlines procedures for engineering, production

planning and progress, machine load, material and tool procurement, and control. Included is a typical case history which reviews an installation that has been in successful operation for several years. *Remington-Rand, Inc., 315 Fourth Ave., New York 10, N.Y.*

Mixing and grinding machinery— Listing a complete line of mixing and grinding machinery, this 16-page illustrated catalog offers information on details, specifications, and applications of each. The equipment covered includes high speed roller mills, double arm kneading machines, horizontal and vertical mixers, constant or variable speed motors, jacketed tanks, and various types of motor drives. Special types of equipment designed and offered for particular processing requirements are also listed. *Charles Ross & Son Co., 148-156 Classon Ave., Brooklyn 5, N.Y.*

Pliovic—This technical bulletin describes the compounding and processing properties of Pliovic vinyl resin. The use of the material in calendering, extruding, and molding operations is also discussed. *Goodyear Tire and Rubber Co., Akron, Ohio.*

Closed mold molding techniques— A series of articles originally published in the *Durez Molder* now forms the content of this 19-page booklet. Complete with line drawings, charts, and tables, the text covers plunger molds; rectangular gates; square runners; diameter and length of runners; sprues; molded density; and plunger molding. Special features of the booklet are a table illustrating the results obtained on heat-resisting and general-purpose materials by compression molding, preheating, and plunger molding, and charts depicting results obtained by the use of various diameters and types of runners and gates. *Durez Plastics and Chemicals, Inc., North Tonawanda, N.Y.*

Cellulose gum—The many applications of cellulose gum, its physical and chemical properties, and a list of industries employing the material, are covered in this new technical bulletin. The booklet is intended as a guide in the use of the material in solving various technical and eco-

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Low cost and desirable properties make MPS-500 an attractive plasticizer for vinyl compounds.

MPS-500 is a stabilized, chlorinated fatty acid ester. It shows excellent compatibility with vinyl chloride polymers and copolymers, and exerts a strong plasticizing action on them.

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nomic problems. Types of gum available, viscosity, compatibility, and other pertinent data are presented. A bibliography of the published literature on the chemical will be found helpful. *Hercules Powder Co., Wilmington, Del.*

Laminated plastics—This 2-color brochure describes services available for the solving of laminating plastics problems. Such service ranges from the offering of a 62-page reference catalog to the personal attention of a company sales engineer. The brochure also lists branch offices and their addresses. *Taylor Fibre Co., Norristown, Pa.*

Production presses—Describing advantages, specifications, and features, and offering other information, a company catalog is now available on the Hydrolairs, power-operated production presses that have neither motors nor pumps but operate on power taken directly from the shop air line. *American Steel Foundries, Elmes Engineering Div., Cincinnati 29, Ohio.*

Esters—Esters of glycerol, glycols, and polyethylene glycols are described in this 24-page brochure. Included are tables on the physical and chemical specifications of the non-ionic polyhydric alcohol fatty acid esters, and data for such uses as surface-active agents, emulsifiers, stabilizers, defoamers, penetrants, and plasticizers. Applications of the esters are described in plastics, cosmetics, food and pharmaceutical products, paints, textiles, and detergents. *Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N.Y.*

Plasticizers—The use of several of the company's plasticizers with allyl starch is explained in this technical bulletin. Formulations are given to illustrate the efficient plasticization obtained with these products. *Baker Castor Oil Co., 118-122 Broadway, New York 5, N.Y.*

New products and services—Over 1000 products developed during 1951 are described in this 80-page compendium. Data includes developments in the fields of television, industrial products, household items, and automotive trade. The booklet is available for 50¢ from *The N. Y. Journal of Commerce, 63 Park Rowe, New York, N. Y.*

INTERNATIONAL PLASTICS NEWS*

Activities Around the World of Interest and Importance to the Plastics Industry in the United States

British vinyl standards—In view of the turmoil in the United States vinyl industry over the establishment of standards (see page 5), it is interesting to note that three such standards have recently been adopted in Great Britain. An analysis of those standards in the November 1951 issue of *British Plastics* indicates that the industry is not unanimously agreed on all details and testing methods embodied in the standards, but that they represent a series of steps in the right direction.

The first standard, B.S. 1763, is basic to the other two; it covers "flexible polyvinyl chloride film and sheeting (unsupported)." The two others, which depend upon this master specification, are B.S. 1774, "Rainwear from polyvinyl chloride sheeting: Part I—Fabrication," and B.S. 1776, "Fabrication of lightweight articles (except rainwear) from polyvinyl chloride sheeting."

The master specification deals with two types of materials: unprinted film and sheeting from 4 to 15 mils thick, and the same material printed. The tests described in the standard are visual examination, thickness, tensile strength and elongation at break, tear strength and internal strain, blocking, extensibility after heat aging, low temperature extensibility, bleeding, and light fastness.

Training program—T. H. & J. Daniels, Ltd., Lightpill Iron Works, Stroud, England, manufacturer of presses and other plastics plant equipment, has received much favorable publicity as a result of its unusual program of providing additional training for apprentices, with particular regard to character training. The company recently decided to include a month's course at one of the Outward Bound Schools as part of its Training Scheme for Engineering Apprentices. A number of trainees from the company are already attending The Mountain School, Eskdale, Cumberland, and the Sea School, Aberdovey, Wales. Foundry apprentices showing special aptitude are also being given the opportunity to attend a month's course at The West Bromwich Training School, which provides specialized training for the iron founding trade.

German Plastics Exhibition—The first large professional exhibition of the German Industry for Artificial Materials will be held in Düsseldorf October 11 to 19, 1952, in connection with the annual meeting of The Economic and Scientific Unions and Organization of the German Industry for Artificial Materials.

Canadian distributors—Harrisons & Crosfield (Canada), Ltd. is now distributor in Canada, except British Columbia, of chemicals manufactured by Cellulose Products Dept., Hercules Powder Co., Wilmington, Del. Included in this new arrangement are soluble nitrocellulose, cellulose acetate flake, cellulose acetate molding powder, ethyl cellulose, chlorinated rubber, and cellulose gum.

Laminates for Australia—As the result of a technical aid agreement between Panelyte Div., St. Regis Paper Co., New York, N. Y., and Charles Hope, Ltd., Brisbane, the latter company has received Panelyte production and sales rights in Australia and New Zealand. The agreement makes available to Charles Hope, Ltd., the Panelyte patents, machinery designs, and formulas used in the production of high pressure laminates.

International Trade Fair—The second Chicago International Trade Fair will be held March 22 to April 6 at the Navy Pier, Chicago, Ill. It is expected to surpass the first fair, which was held in August 1950 and had an attendance of 250,000. At that time, 2200 exhibitors from 44 nations participated. Headquarters for the fair are at Merchandise Mart, Chicago 54, Ill. European office is Hotel

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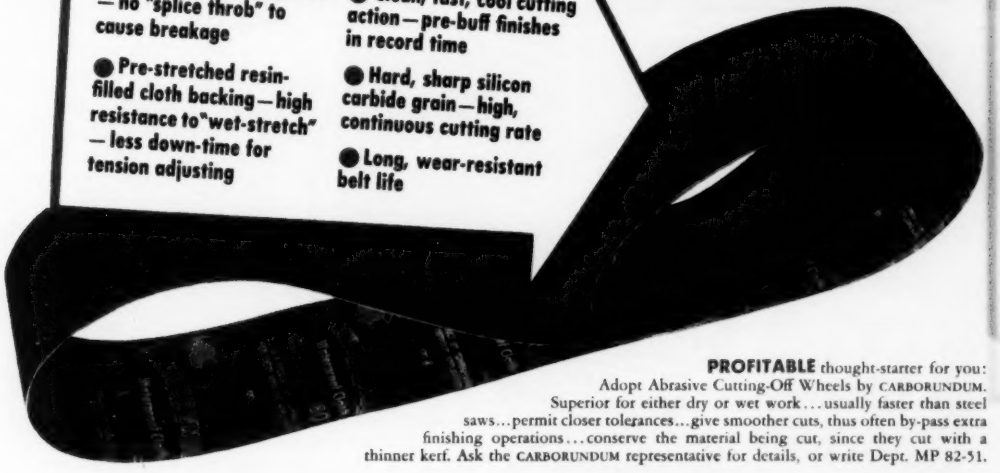

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Bedford, 17 Rue de l'Arcade, Paris VIII, France, and a British office is located at 12 St. George St., Hanover Square, London W 1, England.

Vinyl plant in Italy—Facilities for the production of polyvinyl chloride resins and compounds such as those manufactured by Monsanto Chemical Co. in the United States are now being constructed at Porto Marghera, Italy, by Societa Industria Chimica, an Italian company in which Monsanto holds an interest.

A chlorine-caustic plant employing De Nora mercury cells has already been put into operation. Acetylene for producing vinyl chloride monomer will be made from calcium carbide from a nearby plant in which Societa Edison, major power company in Italy, has an interest. The polymerization plant, also being built at Porto Marghera, will be the largest of its kind in Italy.

Closure plant in Israel—A plant equipped with fully automatic machines for the production of plastics closures for bottles and tubes has been established at Haifa, Israel, by Ternaklit, Ltd. The plant is equipped with Swiss compression molding presses, and is molding phenolic and urea closures.

Silver Anniversary—Eckert & Ziegler G.m.b.H., Weissenburg, Germany, a pioneer in the injection molding field, celebrated its twenty-fifth anniversary last month. The company was founded in 1926 for the manufacture of injection molding machines and molds for thermoplastics. Eckert & Ziegler was the first to build a horizontal type injection machine, and at one time was exporting such machines to England, Canada, and the United States, as well as most European countries. In 1937, the company developed a water hydraulic system for the operation of its machines, which had been air-operated up until that time.

Since its foundation, the company has built about 1800 injection machines. It is now producing a hand-operated ¼-oz. machine and hydraulically operated machines of 1½-, 3-, 6-, and 10-oz. capacities. It is also working in cooperation with Niederrheinische Maschinenfabrik Becker & van Hüllen, Krefeld, manufacturer of machines up to 35-oz. capacity.

Epoxy Protects Aluminum

APPLICATION of an ethoxyline coating to the interior surface of an aluminum container used in a cream whipping unit made by Kidde Mfg. Co., Inc., Bloomfield, N.J., has rendered the inner walls of the container impervious to the action of the fatty acids in the cream contents. The aluminum bottle is designed to hold fresh cream and is attached to a dispensing unit which whips the cream just before it is ready to be served.

The durable Araldite epoxy coating resin was developed by the technical service department of Ciba Co., Inc., New York, N.Y. Its application involves a simple procedure. The aluminum container is filled with the liquid resin, and the excess is poured out after a short interval. The resin which adheres to the inner surface of the bottle hardens to form the coating.

This coating protects the container from corrosion and simplifies cleansing operations, improving the efficiency of the dispensing unit and lengthening its life. Before the adoption of this protective coating, the service life of the cream container was considerably shortened by the attack of the acids.

The effective protection afforded by the Araldite epoxy in this product suggests its further use in a wide range of industrial and commercial applications for coating, casting, and bonding.

Complete assembly and cross-section of container having protective epoxy coat

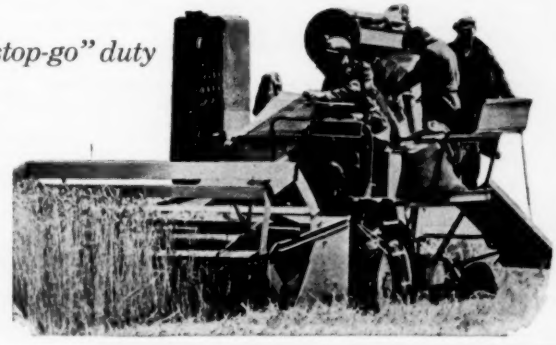
Courtesy Ciba Co., Inc.

IDEAS in the making!

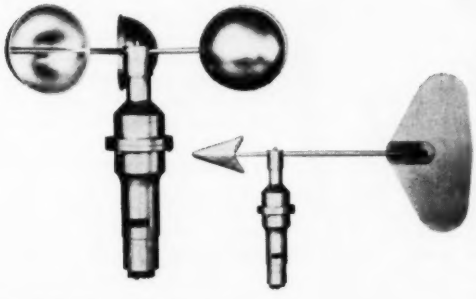
Ardux* *Bonding Resins and* Araldite* *Bonding, Casting and Coating Resins developed by Ciba Research are simplifying manufacturing methods, improving product efficiency, and opening new fields of product development. You will want to know more about them.*

Improves efficiency in rugged "stop-go" duty

As demonstrated in the bonding of the linings to the brake drums of this modern reaper, Ardux Resins fill a unique niche in product engineering wherever durable bonding of metals, (ferrous and non-ferrous), and plastics to natural or synthetic rubbers is required under extreme conditions of vibration, torque, friction, etc.



Editor's Note:—High strength at high temperatures, reduction of stress failure and shock loading achieved through use of Ardux Resins improves manufacturing methods and adds new selling features to products of the automotive, aviation and allied industries. Send for Ardux Technical Bulletin.



Courtesy of W. & L. E. Gurley, Troy, N. Y.

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Araldite Resins simply and durably bond the cups to cup arms of the precision-built Wind Velocity Transmitter, and bond the tail fin on the vane of the Wind Direction Transmitter. In both instances Araldite Resins proved superior both in manufacturing and functional efficiency in withstanding both high wind velocities and exposed conditions than the brazing methods previously used.

Editor's Note:—Araldite Bonding Resins by their wide range of use, and overall economy, have improved many established operations and opened important new fields of product development. Send for Araldite Technical Bulletin.

Idea Generators! Newest ARALDITE and ARDUX Resins Technical Bulletins are now ready, giving complete details on physical properties and recommended procedures. Profusely illustrated with application photographs.

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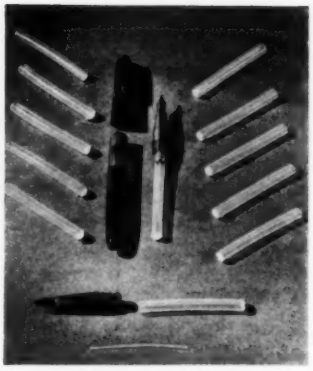

New polyethylene pen sac will not harden with age nor be stained by ink

Pen Sac

GOOD aging characteristics of polyethylene are one of the reasons why it is used in a new type of fountain-pen ink sac which the manufacturer, Anchor Plastics Co., New York, N.Y., claims will give four to five times the "writing mileage" previously possible with other types of ink sacs.

The sac is made from extruded translucent Aeroflex polyethylene tubing, heat sealed at one end on specially devised automatic equipment. The tubing is 2½ in. long, and has a 0.250-in. i.d. and 0.275-in. o.d. This wall thickness is thinner than that of the soft rubber which it replaces, but the polyethylene sac is stiffer and will not harden with age. In addition, it is not stained by ink.

An inner, or breather, tube, also made of Aeroflex, fits in the sac. Its function is to let air out when ink is entering the sac and to regulate the flow of ink when writing. It is 2¼ in. long with a 0.072-in. o.d. The inner tube was formerly made of hard rubber which was high priced and had a tendency to crack.

The sac, which has a capacity of over 60 drops, is filled simply by squeezing between the fingers. Two squeezes fill the pen. Due to the mechanical properties of the polyethylene sac, no metal pusher bars, pins, or levers are required in filling the pen. This results in a saving in cost and assembly time and in the elimination of the use of materials in short supply.

Safety Windows

BY installing shatter-resistant acrylic panels as a replacement for glass inspection panels on its machines, Salt Lake Flour Mills, Salt Lake City, Utah, has effected a cost saving totaling several thousands of dollars annually. In milling plants it is standard procedure for workmen to tap the inspection panels with blocks of wood in order to dislodge flour clinging to the inside surface so that particle size and flow rate can be checked. Rate of breakage of glass windows under this treatment was very high, resulting in production loss since flour had to be discarded which might have been contaminated by glass particles.

The acrylic panels, supplied by Rohm & Haas Co., have excellent clarity and the ability to withstand impacts many times that required to break glass of equal thickness. Company spokesmen estimate that several hundred barrels of flour were saved during the first three months after the plastic panels were installed.

Among the milling machinery on which Plexiglas panels have replaced glass are purifiers, elevators, and rollers. The plastic panels have also been installed in place of wooden inspection panels on vertical elevator tubes that conduct flour from one mill level to another. Formerly, the wooden panels had to be removed for inspection of the tubes, permitting a large amount of flour dust to escape.

Acrylic inspection windows are shatterproof; replacement costs are low

Photo courtesy Rohm & Haas Co.

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Clopay research has made revolutionary progress in the development of precision plastics with material characteristics of the widest versatility.

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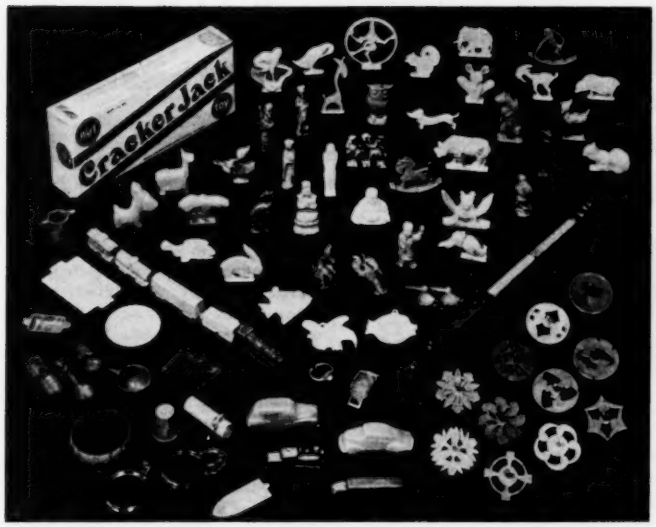


Styrene premiums are non-toxic, have pleasant feel and color, and are light in weight; novelties are custom-molded on molds made from scaled-down models

Cracker Jack Premiums in Plastics

PRIOR to World War II, most of the premiums used in each package of Cracker Jack were metal, but since that period plastics have taken over a major share of the program. Currently, about 75% of the Cracker Jack novelties are molded plastics (primarily styrene), with most of the remainder of paper, and less than 1% of the total of metal.

Initially, plastics were adopted as "substitutes" because metal novelties were not available in the quantities required. But Cracker Jack, which probably uses more premiums annually than any other business organization, has long since abandoned any conception of plastics as substitutes, because of their proved advantages over other materials.

High on the list is the factor of color. Furthermore, the plastic items are non-toxic and have a pleasant, friendly feel. The light weight of the plastic toys is also in their favor.

Most of the plastics novelties are developed directly by the company as part of a broad and soundly formulated program. Heading up the program is Frank A. Werner who, in addition to his executive duties with the company, is an accomplished artist and silversmith. Mrs. Werner, who also has an artistic background in industrial designing, assists him in this activity. In their world-wide travels, they are ever on the alert for objects which might provide the inspiration for an unusual new toy.

Cracker Jack requires approximately 200 million molded plastic novelties per year—a figure which helps to explain why the job is entrusted to regular custom molders rather than handled as an in-plant operation. By having a number of active molds distributed among several suppliers, the firm is always assured of an adequate inventory.

Most of the items are run on 8-oz. injection machines in 40-cavity molds which produce four each of ten different novelties. The models made by Mr. Werner are scaled down to size and hobs are made.

Molders tooling up for a Cracker Jack novelty run must exercise ingenuity to meet competition. An example is a mold currently being run by Plastic Molded Products Co., Chicago, which includes miniature railroad cars. In order to eliminate knockout pin marks on the finished pieces, Formold Plastics, Inc., Chicago, furnished molds designed so that the runners knock out the piece.

Card Holder

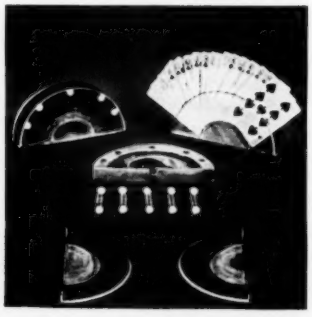
LAYING your cards on the table is a simplified procedure with a styrene table model card holder manufactured by Click, Inc., Landing, N.J. The holder consists of two transparent end pieces with ¼-in. base flanges which are cemented to the base of a center piece. Five through holes are molded-in the center piece near the outer edge. During assembly, two styrene balls, separated by a light spring, are inserted in each of these holes. The springs keep the balls in light contact with the end pieces; when cards are slipped between the balls and the end pieces, they are held there by the pressure exerted by the springs.

The holder can accommodate any number of cards, even up to a full deck. Since there are spring-loaded balls on each side, cards can be put into the rear section when the front portion has been filled. Cards can be inserted, fanned out, and withdrawn using only three fingers.

Fibro Corp., Garwood, N.J., molds the center and two end pieces in four-cavity dies with styrene material supplied by Bakelite Co. The center piece is run on a 16-oz. H.P.M. injection machine and the end pieces on 9-oz. machines. The balls are made by Ace Plastic Co., Jamaica, N.Y., from styrene supplied by Catalin Co.

The card holder is particularly effective for certain games like Canasta where melds can be held in the rear slot, separate from the unmatched cards which are held in the front portion.

Cards are held in place against transparent styrene end pieces by pressure of styrene balls backed up by springs



A PATENTED NRM FIRST


UNITED STATES PATENT OFFICE

23,500

APPARATUS FOR EXTRUDING THERMO-PLASTIC MATERIALS

Wilhelm A. Maxworthy and Elmo E. Bordner, Akron, Ohio, assignors to National Rubber Machinery Company, Akron, Ohio, a corporation of Ohio

Original No. 2,487,865, dated September 10, 1944, Serial No. 573,124, January 27, 1945. Application for reissue October 18, 1946, Serial No. 703,933

2 Claims. (Cl. 18—12)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue

1

This invention relates to a method and apparatus for plasticizing and extruding powdered, granular, flaked, or like thermoplastic materials.

Heretofore, plasticizing and extruding machines having various types of extruding screws for thermoplastic materials have been used, for example. In the rubber art, the extruding screws usually having had a single threaded extending the length of the screw, and the screw threads having been designed in various ways for elimination of air bubbles from the plastic material and for the purpose of maintaining proper pressure at the extrusion head of the machine.

None of the known prior art extrusion devices, however, are entirely satisfactory for use in plasticizing thermoplastic materials, such as ethyl cellulose, vinyl chloride, vinyl acetate, cellulose acetate, cellulose acetate butyrate, cellulose nitrate, and possibly trade, methyl methacrylate resins, and the extruder many others, which when fed into the extruder are in powdered, granular, flaked form. One reason for this is that the physical characteristics of materials of the type enumerated are such that the plasticizing process tends to reduce the bulk of the material sometimes to as much as one third of its original volume. Thus, there was a tendency for the extruder to be starved, with consequent proportionate reduction in the pressure toward the extrusion end of the screw. It has been found that the reducing of the effect of screw pressure in this manner causes the material to be masticated too long, whereby it becomes overheated and discolored, the rubber extruded product frequently being semi-plastic, lumpy, or of non-uniform consistency because of the overheated condition. Moreover, the [illegible] tubes from such devices in a satisfactory manner [illegible] tion of the heating stock.

Because of certain characteristics of materials of the type mentioned above, it has been a [illegible] time in the past to form the same into articles by injection molding, which method, of course, [illegible] disadvantages and limitations.

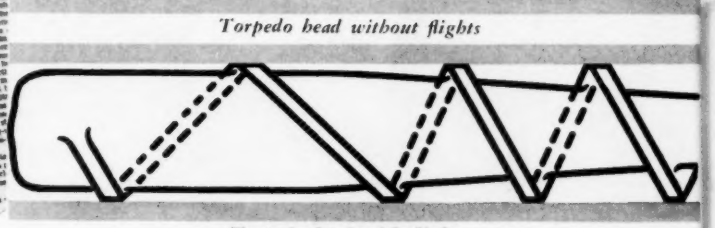
An object of this invention is to provide [illegible]

2

length of the screw, regardless of variations in the bulk of the material as it is plasticized from the pelleted or like form to a desired plastic condition, [illegible] will be kept flowing uniformly [illegible]

"THE TORPEDO HEAD is tops FOR PLASTICS EXTRUSION"

Torpedo head without flights



Torpedo head with flights

There's no doubt about it! The "torpedo-type" feed screw—an exclusive NRM feature—is tops for the extrusion of most thermoplastics.

So named because of the shape of its head, the "torpedo" screw has three production improving functions. It gives excellent mechanical mixing by rolling and shearing a relatively thin layer of plastic. It achieves more efficient heat distribution through the compound, providing closer control over frictional heat. It serves as an accumulator, giving more uniform cross-sectional pressure and minimizing pulsation at the die.

The NRM "torpedo" head, with or without flights, is extensively used for the faster, better extrusion of such relatively rigid compounds as polystyrene, cellulose acetate, cellulose acetate butyrate, ethyl cellulose and others. It's also used for the "close tolerance" extrusion of elastomeric compounds such as polyethylene.

Investigate the "torpedo" today. It's the result of long experience in extruder design. It's fully proved in the production of billions of feet of better extrusions. It's highly recommended by leading resin suppliers. Write to the experts at NRM — let them put their "know-how" into improved production for you.

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"PLIOVIC" VINYL RESIN. New general information manual on handling "Pliovic A" vinyl resin for calendering, extruding, and molding. Covers properties, compounding, processing, and applications. The Goodyear Tire & Rubber Co., Inc. **(B-201)**

TESTING PLASTICS. Folder explains facilities for conducting actual weathering, salt atmosphere, immersion, and sunlight testing of plastics for predetermination of durability and permanence. South Florida Test Service. **(B-202)**

CAPS AND PLUGS. Bulletin illustrates various vinyl caps and plugs for use in tube ends as protection against dirt and damage. Chart shows sizes available. The S.S. White Dental Mfg. Co. **(B-203)**

PLASTICIZERS. Catalog contains data on the characteristics of a number of important plasticizers for vinyl chloride, butyrate, and other plastics. Handy table compares physical properties. Hardesty Chemical Co., Inc. **(B-204)**

ELECTRIC HEATING UNITS. Catalog contains specifications and prices of many types of electric heating units including cartridges, strips, cylinders, hot plates, and immersion heaters with applications within the plastics industry. Watlow Electric Mfg. Co. **(B-205)**

NYLON COATING OF WIRE. Booklet discusses the methods and equipment required for the application of nylon coatings in the manufacture of electric conductors. Details on coating methods and takeups. Industrial Ovens, Inc. **(B-206)**

VISCOMETER. The Brookfield Synchro-Lectric Viscometer, instrument for quickly and directly measuring the viscosity or flow characteristics of materials, is presented with complete specifications and advantages. Brookfield Engineering Laboratories. **(B-207)**

INJECTION MOLDING MACHINE. Sheet contains detailed specifications on the Fellows Model 1B-3-15 3-oz. fully automatic injection molding machine. Fellows Gear Shaper Co. **(B-208)**

PRODUCTION FACILITIES. Illustrated booklet explains the facilities for injection and compression molding, manufacture of reinforced plastics, mold making, and product finishing available at General American Transportation Corp. **(B-209)**

ELECTRIC HEATING ELEMENTS. Folder describes the advantages of and illustrates applications for Chromalox packaged automatic electic heating units which combine heater and thermostat in a single unit. Edwin L. Wiegand Co. **(B-210)**

HYDRAULIC CYLINDERS. Complete dimensional and engineering data on various types of hydraulic cylinders including single acting and double acting models. Miller Motor Co. **(B-211)**

TUMBLING MACHINES. Bulletin tells about the use of "Tumb-L-Dur" burnishing machines for burnishing and polishing small parts. Tumb-L-Matic, Inc. **(B-212)**

LABORATORY PRESS. General applications, improved features, and accessories for general research are included in booklet on the Carver laboratory press. Prices and specifications included. Fred S. Carver, Inc. **(B-213)**

"ARALDITE" LIQUID ADHESIVE. Bulletin covers the characteristics of "Araldite" liquid adhesive Type II for bonding of metal to metal or to other heat-resistant materials involving large surface areas and mass production. Ciba Co., Inc. **(B-214)**

EXTRUSION EQUIPMENT. Bulletin covers NRM 1- to 8-in. extruders, a two stage extruder for pre-blending and drying, special dies and haul-offs for extruding film, and other specialized extrusion equipment. National Rubber Machinery Co. **(B-215)**

VERTICAL INJECTION MOLDER. Bulletin and specification sheet contains details about the Watson-Stillman 6-oz. vertical injection molding machine which is of particular advantage where inserts are used. Watson-Stillman Co. **(B-216)**

ACETATE MOLDING POWDER. "Ampacet," a thermoplastic cellulose acetate molding powder for injection and extrusion molding, available in crystal-clear transparent and all colors, is discussed. American Molding Powder & Chemical Corp. **(B-217)**

HEAT TREATING STEELS. Convenient slide chart covers the heat treatment of tool and die steels. The Carpenter Steel Co. **(B-218)**

MASTER TOOLMAKER. Description and specifications of a highly adjustable machine for wide variety of intricate tool making assignments. J. Arthur Deakin & Son. **(B-219)**

CRONING PROCESS. Booklet contains data on recent developments in the Croning Process of producing foundry molds and cores. Step by step photos present fundamentals of the process. Bakelite Co., Div. of Union Carbide and Carbon Corp. **(B-220)**

BATCH BLENDERS. Rotary batch blenders for precise mixing of particles of varying weights, densities, and fineness are described. Sturtevant Mill Co. **(B-221)**

PEARL ESSENCE. Magazine reprint tells what pearl essence is and explains how it is applied in lacquer form to various products by dipping and spraying. Mearl Corp. **(B-222)**

INORGANIC COLORS. The properties of Ferro inorganic colorants for a wide variety of products including polyvinyl chloride, automotive enamels and lacquers, cellulose acetate, melamine, styrene, etc. Useful charts. Ferro Corp. **(B-223)**

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FLEXIBLE SHAFT MACHINES. Folder illustrates various models and accessories for Foredom flexible shaft machines. Explains uses and contains price lists. Foredom Electric Co. **(B-224)**

BATCH MIXERS. Folder contains information on a horizontal shaft ribbon-type mixer for mixing dry products and for blending liquids or semi-liquids with dry powder. R. N. Bailey & Co., Inc. **(B-225)**

"FLEXOL" PLASTICIZER. New book describes the properties of "Flexol Brand" plasticizers and their applications in plastics, coatings, and other rubber compounds. Details on how they are used in vinyl dispersions, nitrocellulose lacquers, and plasticizer emulsions. Carbide and Carbon Chemicals Co., Div. of Union Carbide and Carbon Corp. **(B-226)**

IMPACT PHENOLIC AND MELAMINE MOLDING COMPOUNDS. Brochure contains complete technical data and specifications of Fiberite impact molding compounds which are available in conventional bulk form or as custom made preforms. The Fiberite Corp. **(B-227)**

INJECTION MOLDING MACHINE. Catalog insert contains detailed specifications and illustrations of a 2-oz., self-contained injection molding press. R. H. Windsor Ltd. **(B-228)**

TRIPLEX DIRECT FLOW PUMP. Data sheet with information on the Aldrich 3-in. stroke direct flow pump series which offers high volumetric efficiency for applications in plastics molding. Specifications sheet and pump selection chart are provided. The Aldrich Pump Co. **(B-229)**

WET BLASTING MACHINE. Bulletin describes a new machine for wet abrasive blasting for all cleaning application in chemical and metal working industries where close tolerances must be maintained. American Wheelabrator and Equipment Corp. **(B-230)**

GRANULATING MACHINES. Facts regarding the Cumberland plastics granulating machines, designed expressly for plastics. Capacity, uses, advantages, etc., are included. Cumberland Engineering Co., Inc. **(B-231)**

"SANTICIZER 8." Group of technical data sheets on "Santicizer 8" as a plasticizer for adhesives, coatings, and molding compounds. Chemical and physical properties and starting formulas. Monsanto Chemical Co. **(B-232)**

MOLDING AND EXTRUSION. Elementary descriptions of the processes, plus 4-color illustrations of numerous products. Company services are described. Technical data includes material selection, tables, charts. Elmer E. Mills Corp. **(B-233)**

ELECTRIC INSULATING MATERIALS. Bulletin describes G-E varnishes, Glyptal alkyd resin, insulating finishes, varnished cloths and tapes, and G-E silicone insulating materials. General Electric Co. **(B-234)**

"SELF-STIK" LABELS. Booklet shows 39 different ways in which "Mystik Self-Stik" labels may be used to place brand identification, instructions, etc. directly on the products. Chicago Show Printing Co. **(B-235)**

VINYL CEMENT. Technical data sheet tells about an adhesive for use both in fabrication of flexible vinyl products and for articles made of rigid vinyl sheets or molded sections. Schwartz Chemical Co., Inc. **(B-236)**

GOVERNMENT SPECIFICATIONS ON LAMINATED PLASTICS. Handy chart shows the various grades of Synthane laminated tubes, rods, and sheets and their corresponding MIL, Military type, Navy, JAN, and A.S.T.M. designations. Synthane Corp. **(B-237)**

ROGERS AND ITS FIBERLOYS. Pamphlet basically about various plastic laminated impregnated materials, but containing many philosophical and sometimes humorous asides on management, labor, advertising, etc. Rogers Corp. **(B-238)**

ELECTRONIC TESTING RECORDER. Group of specification sheets on the Olsen Model 51 electronic recorder and testing equipment for use with it, for measuring stretch, strain flexure, and other deformation in plastic samples. Tinius Olsen Testing Machine Co. **(B-239)**

PLASTIC MOLDING PRESSES. Various semi-automatic molding, heating, cooling, and hobbing presses, hydraulic pressure pumps, accumulators, etc., are described with specifications and other information. Dunning & Boschert Press Co., Inc. **(B-240)**

MATERIALS HANDLING EQUIPMENT. Complete catalog of vibrating batching equipment, machine feeders, joggers, shakers, and weighing machines with numerous applications within the plastics industry. Syntron Co. **(B-241)**

PLASTICS AND RUBBER CALENDER. General specifications, design improvements, parts list and drawings, diagram of roll arrangements for various kinds of production, and illustrations of over 30 calenders are contained in a booklet issued by Farrel-Birmingham Co., Inc. **(B-242)**

25-IN. PANTOGRAPH ENGRAVER. Bulletin describes the newest portable industrial engraving machine, Model I-S, manufactured by New Hermes, Inc. **(B-243)**

RESIN COLOR CONCENTRATE. Detailed information on "Unicolor" with special emphasis on the use of this concentrate in extrusions. Westchester Plastics, Inc. **(B-244)**

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Bottle Coaster

A DOUBLE-well coaster molded of polyethylene or vinyl accommodates a one-quart bottle of Vani-Sol, a toilet bowl detergent, and a mop with which the cleansing agent is applied. These two plastics were found to be the only materials that successfully resist the cleanser, an acid type, metal inhibited liquid.

The manufacturer, National Laboratories, Inc., Toledo, Ohio, initially wanted a semi-rigid coaster that would fit on to the bottle and yet provide a place for drippings. The idea was later expanded to include a place to store the application mop which is always sold with the cleanser.

Development of the final model, called Koaster-Kit, was done in conjunction with the molder, Peerless Molded Plastics, Inc., Toledo, Ohio. Koaster-Kits are produced in blue vinyl or blue polyethylene, supplied by Bakelite Co., in a two-cavity injection mold that is run on a 12-oz. Lester machine. No finishing operations are required other than the printing which is hot stamped on the front of the unit.

Due to the flexibility of the polyethylene used, and the design of the bottle well in the front of the kit, the well easily accommodates bottles in which commercial variations of base size are often as great as 0.040 inch.

Dry Lubricant Dispenser

SPRAY application of a dry lubricant is facilitated by the use of a squeezable Plaxpak polyethylene bottle produced by Plax Corp., Hartford, Conn. One dry lubricant producer, Moly-Lube Products, Great Neck, N. Y., has taken advantage of this type of dispensing unit in the marketing of Moly-Lube, a pure commercial grade of molybdenum disulphide powder.

The bottle is of 4-oz. capacity and is equipped with a horizontally hinged type of cap that force-fits into the container and thus prevents spillage when the unit is not in use. Shaw Insulator Co., Irvington, N. J., molds the natural polyethylene cap.

The flexible dispenser permits the machine operator or maintenance man to spray the powder in economical quantities where lubrication is needed—on moving parts, dies, or conveyors, or into remote recesses, for example. It can be manipulated with one hand so that mixing of the material with wet lubricants is possible. The bottle is also impervious to contaminating matter in the shop.

Moly-Lube has a low coefficient of friction and prevents galling and seizing under conditions of high velocity, high pressures, and extreme temperatures. Its uses include "running in" of new machines, deep drawing, and interference fit assemblies, among other applications.

Squeezable polyethylene spray bottle is handy dispensing unit for lubricant

S. P. I.

(*Continued from p. 81*)

matter, compared to the major problems which are encountered with formulation, temperature control, and constant tension windup.

A continuous trend has been observed toward the production of thinner gage calendered film. An increasing quantity of films lighter than 3 mil is now being produced, and thicknesses of 2 and 1.7 mil are obtainable in production quantities. However, it appears that there is a limited market for these very thin films and, from a calendering standpoint, their production is generally considered uneconomical.

In-line embossing equipment which can be attached to high speed plastics calenders, as well as new types of automatic windup equipment, have added considerably to the ability to produce finished film at higher speeds than were heretofore considered attainable.

Cast Film

The advantages of cast film were listed by D. G. Higgins, Engineer, Plastics Div. of the John Waldron Corp. Among other things, Mr. Higgins pointed out that cast film has been produced at a rate as high as 100 yd. per minute. Limitation of operation is not in the casting head or in the rewind assembly but is dependent on the equipment for heating and fusing.

Total cost of an installation to operate at 50 yd. per min. would approximate $40,000 to $70,000. High pressure steam or water system is not required for a casting installation. Fewer personnel are necessary in film casting than in calendering, and skilled personnel such as steam engineers and calender operators are not necessary. Casting equipment requires no special foundations. Operating capacity of the casting equipment can be increased at a later date by expanding the oven capacity. No time for preparation is required to start the casting machine in operation; no warm-up is necessary. Any thickness of film can be cast, from thinnest to heaviest, with uniform gage control. Short runs are practical and width, gage, and color changes can be made very quickly. Supported films can be produced with various formulations for anchorage, flexibility, abrasion resistance, luster, and so forth. Cast unsupported films permit the operation of transfer printing; cast unsupported films permit molded embossing by use of an embossed paper base.

Mr. Higgins also presented a comparatively new development in cast vinyl film. It was a sponge vinyl sheet produced in continuous operation without side dams or pressure web from a composition developed by the Interchemical Corp.

Film Extrusion

Extruded polyvinyl chloride film is now on the verge of real commercial exploitation, and because of its strength, clarity, and feel, it should play a major role in the markets for thin gage film, according to the paper of Willard D. Crater, Jr., assistant manager of vinyl sales, Naugatuck Chemical Div., U.S. Rubber Co.

In his paper, Mr. Crater pointed out that most of the dies now used for extruding other plastics are unsatisfactory for vinyl, but new type dies being designed especially for vinyl may be used for other plastics. Film manufacturers believe it is necessary to develop wide flat dies for finer gage control and point to the excellent experience they have had with manifold dies for the extrusion of polyethylene. The problem to overcome is that dies that would extrude sheet as wide as 80 to 100 in. are expensive and would cost more than the extruder itself. Charts were shown to compare the various properties of extruded and calendered vinyl and, although it is obvious that calenders can out-produce present day extruders, greater flexibility in gage and width film is provided by the extruder. A 96-in. calender for making film 2 mils in thickness may cost up to $250,000 in comparison to a 4½-in. tuber which, although it has only one-fourth the output of the calender, costs, with the die, less than $25,000.

An interesting suggestion thrown out by Mr. Crater was with reference to "Luvitherm," a German made rigid vinyl film produced before the war which had reportedly withstood —80° in rapid freeze packaging. He also said that rigid film has been experimentally blown and additional developments are ex-

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pected to be able to produce a thin gage rigid film in the not too distant future.

Financial Trends

The comparative stability of the price range of vinyl film has been one of the outstanding features in the development of this industry, according to A. James Mill, vice president of Mill Factors Corp., who presented a paper entitled, "Economic and Financial Trends." Mr. Mill said that the basic prices of the large suppliers did not fluctuate more than 5% during the year beginning June 1950. This has been most gratifying in that inventories have been or are being liquidated without the substantial losses that have been sustained in the textile and garment industries.

Mr. Mill drew upon his company's experiences to set up a hypothetical film company which he called "The Composite Vinyl Film Products Corp.," and used that as an example to show the condition of the industry. This company's inventories would have grown from $22,000 in 1948 to $104,000 in 1951; its working capital from $20,000 to $41,400; its fixed assets (equipment) from $8000 to $41,400; and its sales volume from $202,000 to $580,000.

For a considerable period during the year 1951 this Composite Vinyl Film Products Corp. was past due on a portion of its indebtedness to Mill Factors. Some of its invoices actually ran months past due. Today it is up to date on all bills and is meeting its obligations on time.

For several years, many vinyl film fabricators will need intelligent cooperation of the film suppliers. A sound but liberal credit policy will be required, and in some instances financial guidance will be necessary. Increased sales volume requires increased working capital. Even the most progressive company must take a breathing spell from the expansion of productive capacity to permit the expansion of that working capital.

Epoxy Stabilizers

Since the epoxy compounds readily react with hydrogen chloride, it is quite logical that these compounds should be investigated as stabilizers for polyvinyl chloride, said F. R. Hansen, Assistant Director, Organic Research, Ferro Chemical Corp., in his paper, "Epoxy Compunds as Stabilizers." He gave various charts and examples of how epoxy materials have been used, and explained that, in view of the cadmium shortages, experiments have been made with zinc as a substitute and that when barium and epoxy compounds are used, the zinc substitute performed reasonably well, since it was only 15 min. short of being as good as the barium-cadmium-epoxy system. Even the latter, he said, is not entirely satisfactory, so sodium phosphate was included in the system. This detracted somewhat from heat stability, but improved light stability made the sacrifice in heat stability worthwhile where good light stability is needed. This system is one of the best heat and light stable systems available.

Chain Store Merchandising

Six years ago, 95% of all the inexpensive household curtains were made from paper, but today this material has practically disappeared as a curtain and drape material and has been replaced almost com-

pletely by vinyl, according to T. E. Whiteman, of the F. W. Woolworth Co. Today, 90% of the paper garment and storage bag business and production is vinyl plastic. About 95% of all aprons women are now wearing are plastic.

Mr. Whiteman expressed his confidence that the vinyl plastic market was going to be an ever-increasing market, and emphasized that his company would do nothing to break down the price structure set up by competent, reliable manufacturers. He said his company would not get into any price war which might eventually eliminate customers' interest because of poor quality and their own interest because of poor profit. He got firmly behind the idea that the word "plastic" should be soft-pedaled and that each plastic should be called by its generic name, rather than by a trade name.

Trade Rules

Development work on a set of trade rules and commercial standards for the vinyl film industry has been going on for several years under the auspices of S.P.I., according to William T. Cruse, executive vice president of the association. In his address, he stated that it is the intent of the association to formulate a set of trade rules which will be comparable to the Worth Street Rules in the textile industry.

Satisfactory tests have been developed for evaluating all but one or two of the properties of vinyl film. Just as soon as possible, these evaluations will be submitted to the Department of Commerce for study and a proposed voluntary commercial standard now in draft form will be submitted to the industry for its approval and suggestions.

Floor and Wall Coverings

Difficult economic problems must be overcome before vinyl wall and floor coverings take over an appreciable chunk of those markets, according to G. E. Field of B. F. Goodrich Chemical Co. Mr. Field, in his paper, "The Future of Vinyl Plastics in Floor and Wall Coverings," said that the market for resilient floor coverings is about 414 million sq. yd. a year and that vinyl floor coverings make up only 40 million of that amount.

The wall covering market is about 350 million rolls a year, but only 70 million of the type that sells for over $2.00 a roll is ever likely to succumb to plastics treatment. Mr. Field pointed out that vinyl can be used on almost every type of existing equipment now being used by wall paper manufacturers. However, a shrinkage problem is encountered when latex in solution is used, and a curling problem comes up when a plastisol is used to cure the shrinkage problem.

If vinyl is to invade the flooring market in a big way, it must be made to sell at the price prevailing in each market, and the quality would probably have to be higher. The two ways to approach the problem are to design a compound with equivalent cost of a linseed oil base and which could be used on existing equipment, or to design a compound that is less expensive than the linseed oil base but which would require a different type of equipment. The first approach seems most practical. It is generally granted that vinyls will improve the properties of all type of linoleum, asphalt, and rubber tile, but the big question is to do the job economically.—END

S. P. E.

(*Continued from p. 90*)

ties of different type molds must be estimated, piece-by-piece hourly estimates require a prohibitively large staff, while "educated guessing" involves too much chance for costly errors. Our company has developed a formula method combining the accuracy of an actual estimate and the speed of the guesswork approach. With it, an experienced engineer can estimate upwards of $50,000 of varying design molds per hour. This system includes: 1) a catalog with list price for each basic type of mold design; 2) formulas for price-wise adding mechanical motions and design formulations; 3) a price list base with automatic index to adjust price lists in line with current conditions; and 4) a cost accounting system to establish new basic design price lists.

Setting up this system 15 years ago, we segregated all previous jobs into basic design groups and prepared actual list prices showing size of mold, number of cavities, length of item, etc. Lists were kept basic, covering hobbed, cast, Kellered, pantographed, or simple profiled cavities. To each list, percentage-wise, were added extra charges for irregular or step type parting lines, angular core pins, rack and pinion core withdrawing, and unscrewing motions. Since July, 1947, adjustments to the basic lists have been made automatically in line with the cost-of-living index published by the Bureau of Labor Statistics. Each full index point on the BLS chart represents a change of ½ of 1% on mold prices. To meet the need for new list price sheets covering new designs or mold trends, we merely analyze all cost records suiting that particular case, and the list price summary on the cost record automatically yields the 1947 basic price. This is then adjusted in accordance with the BLS index.

Mr. Reiling: Meehanite Grade A has proved superior to all other types of tool steels for transfer plungers. The compressive and tensile strengths of the material are sufficiently high to avoid splaying and flash indentations. Cleaning characteristics are excellent; and, with the proper heat treating, Meehanite plungers can be brought to a Rockwell C-45. The use of this material has been expanded beyond the use of plungers to movable core pins where close tolerances are desired without galling at high temperatures and high pressures without lubrication. The material offers considerable promise for use in molds because of close grain structure and freedom from pits and blow holes. The flame hardening characteristics of the material also offer possibilities for complex mold structure.

Reinforced Plastics

Moderator — Arthur Wiltshire, Apex Electrical Mfg. Co., Cleveland, Ohio. Panel members: Robert Morrison, Molded Resin Fiber Co., Ashtabula, Ohio; Ralph Benson, Crosley Div., Avco Mfg. Corp., Cincinnati, Ohio; Joseph Finger, Corrulux Corp., Houston, Tex.; Milton Brucker, Zenith Plastics Co., Gardena, Calif.; J. D. Robinson, Perrault Bros., Inc., Tulsa, Okla.; Roger White, The Glastic Corp., Cleveland, Ohio; Tom De Marco, Monsanto Chemical Co., Plastics Div., Springfield, Mass.

Before calling upon the panel members for their individual remarks, Mr. Wiltshire listed the following as requisites for mass production of reinforced plastics: 1) Good tooling and tooling design know-how; 2) Good presses, machinery, and other capital equipment; 3) Uniform resins and glass for proper production and quality control; 4) Product designers who can analyze the problem and design a new product or redesign a product into a reinforced plastics unit.

Mr. Brucker: Progress made during the past two years in production of the Eames Fiberglas chairs includes reduction of rejection rate from 10 to 1½ percent. Quality-wise, we believe our present chair shells are at least 90% better and more constant. The increase in production efficiency can be attributed mainly to re-work of hydraulic and preform equipment. This is especially true of the quality control on preforming binders, resins, temperatures and catalysts.

Mr. Robinson: Fibercast pipe as produced by Perrault Bros. is a glass fiber reinforced polyester product. Special couplings have been developed for both permanent and temporary installations since none of the conventional couplings are suit-

able. Corrosion resistance of the pipe to the action of acidic materials, the light weight (about 1½ lb. per ft. of 4-in. pipe), the high strength of the plastic product, and other obviously desirable properties have stimulated great interest in this pipe.

Mr. Morrison: We have made over 400,000 bread trays of one type and they have been outstandingly successful in use. They are of reinforced plastic, which does not dent, does not dissipate heat away from warm fresh bread, has no slivers or nails, and can be washed. A metal wire imbedded around the edge gives additional rigidity and edge impact. Over a two-year period, none of the trays have gone out of service.

The tray consists of one layer of 2 oz. glass mat, stapled around the wire frame. A filled pigmented polyester resin is then poured on the mat and wire preform in the dies, a special paper label is laid on after the resin is poured, and the press closed. We do all our work with hydraulic presses and matched metal telescoping dies. We do not believe that satisfactory low cost, high production items of our type can be made by any other method.

Topics covered by other members of the panel included refrigerator liners, flat and corrugated panels for decorative and glazing applications, production of intricate parts, and use of glass reinforced styrene. In his discussion of Lustrex loaded glass mat, Mr. DeMarco reviewed methods of production, compression and injection molding techniques, and comparative physical properties of loaded glass mat molded by the two methods. Mr. Benson discussed Crosley's new refrigerator food liner, describing both its advantages and disadvantages, and future prospects, which involve trial production runs, field tests, and ultimate evaluation.

Plastical Archeology

Dr. Johan Bjorksten, Bjorksten Research Laboratories, Chicago.

Dr. Bjorksten's unique presentation was in the form of a hypothetical report on early development of the plastics industry, based on archeological studies supposed to have been made in the year 6943, or approximately 5000 years hence. Specially prepared photographic montages gave the talk a vivid and authentic flavor. In introducing the

speaker, "Prof. E. L. Bookbrowser" declared that "excavations on the site of the ancient habitation formerly called Chicago have led some archeologists to believe that the Plastics Age must have been born, developed, and reached great applicational maturity in an incredibly short space of time when compared to the metal age and the stone age which preceded it."

Purpose of the unusual presentation was to peer into the future of the plastics industry, indicating the probable developments and results.

Injection Molding Heavy Sections of Polystyrene

Gordon B. Thayer, Plastics Technical Service, Dow Chemical Co., Midland, Mich.

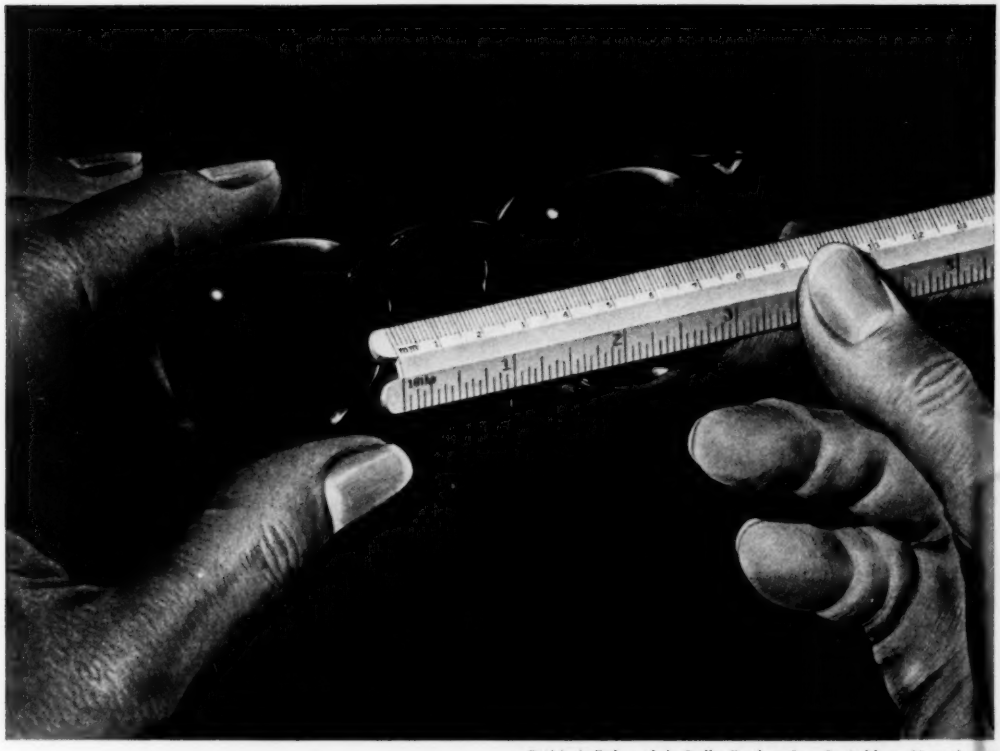
Injection molding heavy sections, over ⅛-in. thick, of polystyrene with consistent success can broaden its range of application. The weight of a heavy section molding is in a range which makes it difficult to compete with some other engineering materials on a material cost basis, but radio cabinets, refrigerators, housewares, and other items have successfully overcome this adverse competitive position through application of efficient molding methods. Recent experience in molding heavy sections of polystyrene indicate the same competition can be overcome in brush blocks, TV lenses, etc.

We have discovered the key to the difficulties encountered in molding heavy styrene sections to be the technique of trapping the correct amount of plastic in the mold under the minimum required pressure. Several known methods of doing this have been re-examined recently. Among them are the ball-check nozzle and various types of nozzle valves, as well as gate cut-off when the cavity is full ("Eight Phonograph Records Per Cycle" — MODERN PLASTICS). Lester Engineering Co. has a patent covering a method of sliding the flat faced nozzle away from alignment with the sprue bushing, to prevent drooling of the nozzle, and a microswitch arrangement which reduces injection pressure as soon as the mold opens a minute amount. Starving the feed to the heating cylinder is a method of holding the plastic in the mold without packing more than is required while the gate is solidifying. However, a difficulty on conventional injection machines is the volumetric measurement of the mold charge; it is not accurate enough. Weighing and starving the feed offers many benefits. Weigh feeding devices are available from B. F. Gump Co., Chicago.

High Impact Styrenes and Copolymers

Dr. Paul Elliott, Naugatuck Chemical Div., United States Rubber Co., Naugatuck, Conn.

Between the hard, rigid, but relatively brittle polystyrene molding compounds and the tough but relatively soft cellulosics there has been a gap. Many desired combinations of hardness, rigidity, toughness, heat resistance, and/or chemical resistance could not be found in commercial molding compounds. The last three years have seen considerable advance in filling this gap. Certain copolymers of styrene have improved heat resistance and chemical resistance with moderate increase in impact; other modified styrenes show considerable improvement in impact at high hardness with some sacrifice



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of heat resistance. Further advance in this field has been found in the development of molding compounds produced by blending styrene copolymer resins with special rubbers.

New Applications and Design Problems

Moderator—Jean O. Reinecke, Reinecke & Associates, Chicago. Panel members: W. T. Cooper, Bakelite Co., Chicago; T. F. Muckenfuss, RCA Victor Div., Radio Corp. of America, Camden, N. J.; Jack Davis, Radio Div., Motorola, Inc., Chicago; Erik Furholmen, consultant, Chicago; Richard S. Burke, Testing and Development Laboratories, Sears, Roebuck & Co., Chicago; James Johnston, Chicago Molded Products Corp.

Mr. Reinecke: The plastics industry pioneered in promoting industrial design, or styling. It is a leader in product design, mold design, tool design—every kind of design including designs on the business of the metal industries!

W. T. Cooper: The speaker exhibited a Bakelite phenolic molded furniture drawer, explaining that it serves as a sample for evalution and consideration by progressive furniture manufacturers. Advantages include: 1) its dimensional stability under a wide range of weather conditions; 2) reduction in noise level of operation, as compared to metal; 3) efficient, one-piece construction; 4) facilitation of cleanliness through elimination of sharp corners, cracks, corrosion, etc.; and 5) wide design possibilities which might be neither practical nor economical in other materials. For large, complex furniture pieces, a wooden or metal front can be used in combination with a frontless phenolic drawer molding.

Mr. Davis: It is very important that the design department of a manufacturing organization which uses plastic materials in its products has fairly accurate information on proper mold design and what can and cannot be done with various types of plastic materials. When three or more plastic manufacturing suppliers are bidding on a particular job, individual problems arise. Each company seems to have a different design problem. What we as manufacturers would like to have from the plastics industry is some consistency and standardization among fabricators, and some set rules, determined and published, which we can use as a bible.

Mr. Muckenfuss: RCA engineers and stylists for many years have been aware of the unlimited applications in which plastics can be used. We use hundreds of plastic items, since they help us to be competitive. As a result, we have needed complex designs that have often taxed the ingenuity of our suppliers; but whether our designs are simple or complex, we have been faced with some serious problems.

The time cycle required to get a mold into full production often interferes with our planning and sometimes our production schedules. After the too long tooling cycle is completed, we must wait until the molder gets the mold in full production. This can be attributed to many problems—differences in equipment, raw materials, mold design, and last, but most important, the thinking of the various molders and moldmakers on how to design and mold a specific job. General agreement is very difficult to obtain. This problem is industry-wide and can be corrected only by a broader exchange of ideas between molders and engineers.

ASTM Standards and Their Effect on Plastics Technology

Robert Burns, Bell Telephone Laboratories, Inc., New York, N. Y.

The paper presented a brief discussion of the impact of ASTM standards on plastics technology throughout this country as well as in foreign nations. Producers and consumers alike were commended for providing a dramatic demonstration of strength through voluntary action. With a single weapon — mutuality of interest — they have made plastics technology in this country the envy of the world, the speaker declared.

Modified Phenolics

Dr. Wyman Goss, General Electric Co., Pittsfield, Mass.

Ultimate desired properties of phenolic molding materials are frequently obtained by the proper selection of fillers, or fillers together with modification of the resins themselves. This is exemplified by the low loss electrical grade material which is generally formulated with mica, or mica and diatomaceous earth filler, and bonded with an

aniline modified phenolic resin to achieve the best electrical properties.

The speaker also discussed furfural as a plasticizing modifier for best color properties, use of tire cord and nylon fillers for strength and heat resistance, and modification of phenolics with synthetic rubber. Standard characteristics as well as special abuse tests were cited to illustrate the material's toughness.

The Role of the Engineer in Sales

Philip Belk, Hercules Powder Co. (presiding); Edmund D. Kennedy, Monsanto Chemical Co.; Amos Ruddock, Dow Chemical Co.

Mr. Kennedy: The approach I have picked will deal largely with the custom end of the business. In brief, the role of the engineer is to encourage sound applications of plastics and discourage unsound applications. Quite often the engineer can suggest additional plastics possibilities above and beyond those suggested by the salesman. He must accept as part of his responsibility the job of making the product look right. He is part of the production and selling team and must face and solve with the salesman and production man the real problems of business.

Mr. Ruddock: The role of the engineer in the successful sale of either custom molded or proprietary plastics products is one of extreme importance. This importance has long been recognized in the custom molding field, but is only now beginning to achieve its deserved recognition in the proprietary field. In this field, however, the engineer is virtually the only guardian of "quality," which is the absolute basis for its continued acceptance by the buying retailers and the public. He must achieve that quality at the lowest possible manufacturing cost.

The inability of the buyer to determine quality in plastics merchandise readily is the cause of the vicious competition which retards achievement of our industry's full sales potential. The engineer must develop standards of quality measurable by simple performance tests by which the superior product can be readily distinguished by anyone from the shoddy. He will need to rely upon market research tools, to maintain contact with the press, with consumer research organizations, leading home economists, and many

others. He must maintain a close relationship with the entire organization engaged in distribution of his company's product. He must provide the information which appears on informative labels, catalog sheets, publicity pamphlets, and advertising used in his company's sales program.

Extrusion of Cellulose Acetate and Cellulose Acetate Butyrate

E. C. Blackard, Tennessee Eastman Corp., Kingsport, Tenn.

Points covered in this talk included the extrusion of sheeting in thicknesses from 0.001 to 0.060 in., extrusion of pipe from 2 to 4 in. diameter, and extrusion of a shell variegated strip, with emphasis on the unique features contributing to a better quality extruded product.

The speaker described details of a hopper dryer, pointing out some of its advantages as compared to a tray or belt dryer. Advantages and disadvantages of using a flat die as compared to a round die in the extrusion of flat sheeting were discussed, as well as the importance of temperature control and uniform flow. He also discussed possible causes of surging in sheet extrusions and equipment alterations for improving the flow of hot material from the die.

With reference to extruded pipes, this paper described a process by which the pipe is cooled by means of hot air issuing from inside and outside sizing rings, affording a simple way of extruding strain-free pipe.

The paper also covered production of a variegated strip using one extruder to feed the amber base material and another the dark filler. This process makes it possible to extrude a variegated strip which can be reproduced exactly from one run to the next and suggests the feasibility of similarly extruding variegated rod.

Extrusion of Vinyl Film

A. M. Stover, Naugatuck Chemical Div., United States Rubber Co., Naugatuck, Conn.

Large volumes of polyvinyl chloride resins are now used to make film by calendering and casting methods. Consumption rose from approximately 18 million lb. in 1947 to about 80 million lb. in 1950. The production of high strength, thin-gage films of excellent clarity and great widths now seems to be commercially feasible, promising the possibility of reaching hitherto untouched markets. This paper reviews some of the problems encountered in developing compounds and techniques for manufacturing blown film extrusions.

Symposium on Military Plastics Applications

Moderator—Robert K. Gossett, Gossett & Hill Co., Chicago. Panel members: John Alfers, Head, Plastics & Dielectric Branch, Material Div., Bureau of Ships, Navy Dept.; Lt. Col. E. L. Sundberg, Director, Production Directorate, Midcentral Air Procurement District, Materiel Command, Dept. of the Air Force; Dr. Warren Stubblebine, Research Director, Chemicals and Plastics Branch, Research and Development Div., Office of the Quartermaster General, Dept. of the Army; Gerald Reinsmith, Chief, Non-Metallic Structural Materials Unit, Ordnance Corps, Dept. of the Army.

Each member of the panel discussed non-classified applications of plastics by his particular branch of the service.—END

Polyethylene

(*Continued from pp. 109-20*)

temperature at which the maximum output rate occurs was higher in the high compound output range than in the low. This was because the higher resin throughput rate removed heat faster and prevented the resin from absorbing enough heat to soften unduly and foul the screw.

Cylinder Temperature Gradient—A brief study of the effect of extruder cylinder temperature gradient on compound output rate and temperature was also made. The screw was controlled at 60°-65° C. (140°-149° F.) and steam pressure was varied in the extruder cylinder section as indicated in Table IX (see p. 120). The extruder was allowed to reach equilibrium for each set of cylinder temperature gradient combinations, the constant output rate again being taken as the criterion of equilibrium. It was again found that approximately 15 min. were required for the extruder to come to equilibrium after changes of cylinder temperatures were made. The results of this experiment indicate that only small changes in output rate are effected by cylinder temperature gradient change within the range studied. Interestingly enough, a complete reversal of the usual temperature gradient produced no great effect on compound output rate.

It was concluded from this that it would be good practice to heat the whole extruder cylinder to the same temperature, except for the hopper feed section where excessive heating would promote bridging. Such a procedure would offer simpler and cheaper control of the cylinder temperature, whether obtained by steam, oil, or electrical heaters with thermostatic controls, since fewer control instruments would be required.

Screen Mesh—To study the effect of breaker plate screen mesh variation on compound output rate, the same extruder conditions were used as described above. Compound output rate and temperature were determined with four different screen packs as indicated in Table X (see p. 120). Rates were determined at two screw speeds and at two screw temperatures. The quality of the film with respect to surface roughness and uniformity of appearance was evaluated by visual comparison of the various samples produced. With medium and fine mesh screens, only slight differences in film quality were noted at low and medium compound extrusion rates, but at higher output rates, 60 lb./hr. or more, the resultant film was considerably rougher than that obtained at lower rates regardless of the conditions used. This was probably due in part to the lower compound temperatures resulting from higher extrusion rates, which in turn caused non-uniform elastic deformation due to the higher pressure developed. This effect appeared as "nervy" or rough surface texture.

Coarse screens yielded rough films even at medium output rates, while compound temperature tended to fall with compound output rate increase, regardless of screen size (see Fig. 3). Optimum screen size depends upon the film appearance required; during this study, optimum output rate with satisfactory film quality was obtained with breaker plate screen packs containing a 100 or 200 mesh screen (see Table X).

Limits of Usable Extruder Capacity

Usable extruder capacity depends upon required quality of extruded film as regards appearance and hot stretchability at the die exit. These properties are primarily affected by compound temperature, which depends in turn upon the output rate, as illustrated by the graph in Fig 2.

Output rate may be increased by

Table XI—Effect of Compound Temperature on Hot Stretchability of Polyethylene Film[a]

Die temp.	*Compound temp.*	*Compound output*	*Minimum attainable film thickness*	*Stretch ratio*
°C.	°C.	lb./hr.	mils	
270	230	19.8	0.7	14:1
230	195	19.0	1.0	10:1
200	175	19.2	1.5	6.6:1
170	145	19.5	2.0	5:1

[a] Film extruded from a No. 2 Royle with 24-in. flat die.

increasing either screw temperature or screw speed, both of which cause a corresponding decrease in compound temperature. The only way to increase the compound temperature is to increase the heat transferred to the resin while in the extruder. This can be done by increasing the heat transfer area (lengthening the cylinder), or increasing the cylinder-to-resin temperature differential (heating the cylinder to a higher temperature). High output rates and resultant low compound temperatures impart nerviness and roughened texture to the film, and also present difficulties in hot stretching, since the film is neither hot nor uniform enough to stretch.

Table XI shows the effect that compound temperature has on the minimum attainable film thickness at given rates. It is clear that the usable extruder output as thin film is dependent upon the degree of stretch required, which in turn depends upon the compound temperature. Methods for increasing extruder output are not useful unless the added output can be delivered at necessary stretching temperatures. This becomes increasingly important when it is desired to produce extremely thin film for paper coating laminations to be made at high production rates.

In this study, the maximum usable capacity of the 3¼ in. Royle No. 2 extruder was found to be approximately 60 lb./hr., with maximum heat capacity applied on all components. The usable capacity could be increased by greater heat exchange capacity, limited only by possible resin decomposition on the extruder cylinder walls and in the die cavity at extreme temperatures. The basic necessity, then, is that of attaining a balance between heat transfer and compound output rate.

Figure 4 (see p. 118) is a nomograph which will be found helpful in estimating extruder film output rate, when film thickness and width and extruder delivery rate in pounds per hour are known.

Acknowledgements

The authors acknowledge the assistance of W. F. Hemperly, under whose direction this work was done, B. H. Maddock for preparation of the accompanying nomograph, and R. H. Carey for his studies of thin film mechanical properties.—END

THE PLASTISCOPE*

NEWS AND INTERPRETATIONS OF THE NEWS

By R. L. Van Boskirk

Floor Coverings

THE floor covering field has been a potentially great user of vinyl resins ever since the increased volume production of vinyl became a phenomenon of the plastics industry. In fact, vinyl floor tile was first shown at the Chicago World's Fair in 1933-'34 when it was made from resin that probably cost $5.00 a pound. The development of this market has been slow, but most analysts believe that important progress toward the solving of the many problems involved was made during the past year.

Markets for the various types of flooring are roughly broken down in the following paragraphs without making an attempt to be too specific.

First is rubber floor covering. The market is estimated at about 10 million sq. yd. a year with a sales price at the factory of about $3.00 per sq. yard. Included in this type of flooring should be listed the asbestos-vinyl type, the factory price of which is about $3.70 a sq. yard. Production of vinyl flooring to compete with this type of flooring is currently estimated to be less than 10% of the total. Chief handicap is a factory price of about $5.40 to $6.75 a sq. yard.

The types of floor tile described above are the highest priced of all and are used largely in public auditoriums, public conveyances, flooring for decks on luxury liners, and other extreme service applications where no other type flooring is suitable.

So-called asphalt flooring is next on the list. It is generally not asphalt but coumarone-indene, since use of this chemical permits lighter coloring. The market is about 60 million sq. yd. a year, and the factory price is from 54¢ to $1.52 a sq. yd.—the average is 85 cents.

Another line very close to asphalt tile is inlaid linoleum which is a combination of such materials as cork, whiting, and linseed oil with solid color throughout. The market is about 70 million sq. yd. a year, and the factory price is from $1.25 to $1.35 per sq. yard.

Most Competitive Plastic—The type of plastic flooring most competitive to the above two grades is similar to the Delaware type now produced under the aegis of Congoleum-Nairn. It is basically a vinyl sheet laminated to felt. It can be furnished in rolls but is often cut into square tile. Sales have been appreciable but have in no sense cut seriously into the volume of asphalt or inlaid linoleum—it might be said that it has taken the cream off the asphalt market rather than making deep inroads.

The fourth and last class is a felt base floor covering. This material is a felt base that may be impregnated with asphalt but is surfaced with what amounts to pure paint. The market for this low cost flooring is from 210 to 270 million sq. yd. annually. The factory price is about 35¢ a sq. yard. Insofar as plastics are concerned, the chief competition to this material has come from the Sanduran type of floor covering. The latter is a material made from a nitrile rubber-vinyl resin treated paper coated with a transparent plastisol or organosol and laminated to a felt base. The factory price for this material varies from 65 to 75¢ a sq. yard.

The latter market plus the inlaid linoleum market seem to be the two principle targets of the vinyl industry at the present writing.

There are many other possibilities than those listed above. For example, there is the Southbridge development which is a printed vinyl combination with sponge rubber which looks like carpeting and sells in the same price class as carpeting.

Molded Tile—One observer in the field also suggests that floor covering manufacturers will eventually discover that the most economical and satisfactory way to make plastic floor tile is simply to mold it in squares in semi-automatic compression presses. Efforts have also been made to extrude vinyl sheet for flooring and cut it into the proper sized squares as it comes out of the extruder. We have no knowledge that either of the latter two methods are being employed to any great extent at the present time.

From the above figures it is not difficult to see that the main problem involved in increased volume for vinyl floor covering is finding a way to produce it at less cost, a point which was so sharply belabored by one of the speakers at the recent S.P.I. Film Meeting in New York. (See p. 81).

Furthermore, it is significant that several vinyl calendering firms which attempted to develop a vinyl floor covering have given up their ambitions to enter the field. It seems to be a business of individual and unusual requisites that can be handled successfully only by those who are established in and understand the floor covering business. Success depends largely upon a combination of marketing and banking that is peculiar to the floor-covering industry. Distributors work on a 70-day cash basis which means that the producer carries a heavy financial burden and markets are so intricately enmeshed that it would require several years for a newcomer to be able to make a dent in the field.

Fabric Filled Melamine

A NEW supplier of fabric filled melamine molding powder to be used in dishware is in the offing. The Fiberite Corp., 516 West 4 St., Winona, Minn., reports that the development stage of its program on this material has been completed and material to meet the requirements of the Quartermaster Corps specifications is on the way. This is interesting news to melamine dishware molders since most of them have so far concentrated on alpha filled melamine for civilian use because of the problems and costs involved in producing fabric filled melamine dishware.

Fiberite is a comparatively new company that has concentrated on the production of high density preforms of phenolics to help solve the problems associated with the handling and molding of bulky impact materials.

According to company literature,

* Reg. U.S. Pat. Office

Steam Station at Moss Landing, California, designed and being constructed for Pacific Gas and Electric Company.

WHEN INDUSTRY NEEDS POWER

Central Boiler House and Water Treating Plant for National Tube Division, United States Steel Company

The experience of Stone & Webster Engineering Corporation is available to utilities or industries requiring facilities for steam or electric generation. The work of the Corporation in the steam power station field aggregates in excess of 8,800,000 kw in capacity, equivalent to about 16% of the utility steam generating capacity in the United States.

STONE & WEBSTER ENGINEERING CORPORATION

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phenolic compounds filled with cellulosic, mineral, and glass materials are extremely difficult to preform on existing equipment now in the hands of molders. It is claimed that the use of custom-made Fiberite high density preforms eliminates these slow and costly operations by the molder. The preforms are strong and durable and will not chip or break during shipping, handling, or storage; but, in common with all thermosetting materials, they should be stored in a cool, dry place at temperatures of from 60 to 70° F. These high impact molding compounds are also available in conventional bulk form if desired.

Who is Simulating Whom?

AN ADVERTISEMENT in New York newspapers by John Wanamaker stores stresses a "plastic coated simulated vinyl" card table top.

Tsk! Tsk! Who is imitating whom these days, anyhow?

Painting Tool

A NEW type painting tool which is claimed to be "the first complete change in the method of manufacture of paint and varnish brushes in more than a generation" has been announced by Pittsburgh Plate Glass Co. The new tool has certain advantages over both conventional brushes and roll coaters.

The instrument, made to retail for $3.69, consists of two narrow metal channels, seven in. long, in which double-length strands of Neoceta bristle are so locked that they can never come out. The bristles, tailored from specially prepared and processed cellulose acetate filament, are similar to those used in the company's standard line of brushes.

Known as the Fleetwing Wall Coater, this tool has a specially engineered handle that is clamped in place and permits an easy, free swinging stroke to provide coverage for large areas. The new tool also eliminates the muss and fuss usually associated with roll coaters. It may be used for applying any type of flat or gloss wall paint including latex, resin emulsion, and other water thinned paints over wallboard, plaster, wood, and various masonry surfaces It is efficient for the application of water paints because the acetate bristles will absorb less than 3% by weight of water, thus retaining elasticity and snap after many hours of use. Hogs' bristles will absorb up to 60% of their weight in water and become soft and flabby.

Vinyl in Sports

TO PROTECT boxers, football players, and other athletes from possible injury to the mouth or jaws, the Maxillofacial Prosthesis Section of the U.S. Naval Dental School at Bethesda, Md., has developed a mouthpiece made of a resilient vinyl resin. The guard fits snugly against the teeth and internal mouth tissues and thus is not easily dislodged; yet the wearer can talk.

The mouth splint is constructed by first taking an impression of the mouth in wax and then transferring it to dental stone. The stone model is filled with a liquid vinyl resin, Elastomer #105, formulation 15k, and placed in a flask which is dry heated in an oven at 150° C. for one hour. The flask is then cooled in water, opened, and the completed splint trimmed and cleaned.

Consolidation

A RECENT purchase of Chicago Die Mold Manufacturing Co. by U. S. Rubber Co. has resulted in a reorientation of the latter company's processing operations. Chicago Die Mold will continue to be operated as a custom molding business for all types of thermoplastics and thermosetting applications. C. A. Peterson, former owner of Chicago Die Mold, will continue as general manager, and C. C. Henry will continue as sales manager. However, U. S. Rubber will consolidate the plastics production and sales for its Mechanical Goods Div. in the Chicago Die Mold plant. The mechanical goods plastics operations were formerly in Fort Wayne, Ind., and Passaic, N. J. These production facilities are now being moved to Chicago. Thus, the Uscolite products, which consist largely of applications fabricated from styrene copolymer sheets, will now be made in Chicago rather than Passaic; the Enrup products—phenolic rubber moldings for such things as gears, roller skate wheels, clicker pads, and hand wrapped hose—will also be produced in Chicago rather than Fort Wayne.

Dr. B. W. Bender, formerly development manager for plastics products at Psasaic, will be in charge of sales of the above named materials in the Chicago plant.

All research and development work in plastics processing will be consolidated at the Fort Wayne plant under Ferris Newman as development manager.

Footwear Div. products will continue to be produced at Mishawaka, Ind., and Chicago, where the company produces Royalite, a sheet material based on styrene, acrylonitrile and rubber; Ensolite, sponge vinyl for ring mats, flotation applications, and so forth; Flotafoam, a foamed urea; and Naugahyde vinyl sheet and coated fabric products. The Naugatuck Chemical Div. at Naugatuck, Conn., remains headquarters for handling vinyl resins, Vibrin polyesters, Kralastic styrene copolymer molding powders, and Kralac high styrene butadiene resins.

Movie Tells the Vinyl Story

A NEW color talking movie has been announced by Landers Corp., 837 Buckingham St., Toledo, Ohio. The new film illustrates the vinyl calendering process from the receipt of raw cotton goods in the plant and the compounding of the vinyl resins through every process necessary before the finished article comes from the plant. The principle end uses, such as upholstery in boats, station wagons, furniture, autos, beauty parlors, barber shops, and so forth, are also shown. First showing of the movie was before a meeting of the automotive engineers in Detroit. The film is intended as a sales aid for the company's product and will be shown only at sales meetings throughout the country.

Big Calenders

FIVE new Z-type calenders are now in the process of construction at the Farrel-Birmingham plant in Ansonia, Conn. Two are ticketed for Canada, one for England, and two for the United States. Four of the calenders will be equipped with 28-in. diameter rolls. The largest, equipped

SWEDLON Spells "SAFETY"

in the DOUGLAS-NAVY R6D

The SWEDLOW-developed plastic laminate with the impact strength to withstand the toughest kind of wear, contributes to the safety and usefulness of the huge new R6D Liftmaster which Douglas is now producing for the Navy in quantity.

With the Liftmaster, the Navy is now able to fly high priority cargo and personnel to any point on the globe in a pressurized transport at more than 300 miles per hour.

SWEDLON is used in the walls, ceilings and as cargo-liner in the Liftmaster. For other uses of this versatile material, including fuel-cell backing manufactured in accordance with applicable Air Force, Navy and customer specifications, consult our engineering staff.

Swedlow PLASTICS CO.

**In addition to SWEDLON Laminates, we specialize in transparent glazing applications for the aircraft industry.*

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with a 36-in. diameter roll, will have a 92-in. width. Despite reports of a larger machine said to be recently installed, this huge "Z" is claimed to be the equal in size of any calender now installed for producing vinyl film or sheet except, of course, those 48-in. diameter roll units sometimes used for processing floor covering materials.

Key Tags

APPROXIMATELY 500,000 transparent plastic key tags were mailed to telephone subscribers in the New York Metropolitan area by the Institute for the Crippled and Disabled as a promotion aid in their fund raising campaign. The key tags are a circular transparent laminate which enclose the addressee's telephone number. If the user's key ring becomes lost, the finder can call the Institute, which will give him the name of the owner of the phone number. Some families wrote in asking for extra tags that could be used as identification for children.

The Institute reports that use of the tags resulted in an encouraging increase in the number of contributors to their fund. The tags were produced by The Jamison Plastic Corp., 71 East Sunrise Highway, Freeport, L. I., N. Y.

Plant Site Acquired

ACQUISITION of a 600-acre tract of land near Williamsburg, Va., has been announced by The Dow Chemical Co. Company officials said that Dow did not expect to make immediate use of the site but planned eventually to build a plastics plant there. The location, which fronts on the James River, would permit delivery of raw materials by boat from the firm's Texas Div. at Freeport.

A Strike for Laminates

BY REPLACING the wooden playing surface of a bowling game machine with a slab of Formica Picwood, the Chicago Coin Machine Co. solved an annoying maintenance problem and revitalized demand for its machines. The wooden surface was rapidly defaced by a puck which slid over the playing surface; the markings, which were applied with decals or by silk screening, were soon obliterated. Taking the machine down for resurfacing resulted in a large revenue loss. The new playing surface, developed by The Formica Co., Cincinnati, Ohio, has scoring rules, instructions, foul lines, and strike zones imprinted by Formica's Artlay process underneath the melamine resin surface lamination giving permanent protection against wear. In addition, the new surface reduces friction and provides for faster play.

Acrylic Thickeners

TWO acrylic thickeners—Polyco 296BT and Polyco 296N—have recently been developed by American Polymer Corp., Peabody, Mass. The two products, which are aqueous solutions of sodium polyacrylate, are water-soluble anonic colloids furnished as straw-colored, homogeneous liquids containing 15% solids. Polyco 296BT is a high-viscosity grade and Polyco 296N is a medium-viscosity grade.

Possessing good adhesive, suspending, emulsifying, and film-forming characteristics, the two agents are recommended primarily as stabilizers, protective colloids, and thickeners for natural and synthetic rubber and for resin latices. Other suggested fields of application include water based latex paints, pigment binders, and latex dipping.

Expansion

A NEW $4.5 million plant has just been completed by Dewey & Almy at Acton, Mass. In this plant the company will polymerize its various resins and also produce battery separators which are made from synthetic copolymer sheet. A year's production of these separators has already been sold.

It is also reported that the company will produce di-iso-octyl phthalate plasticizer, a pilot plant for which is already underway. The company will buy iso-octyl alcohol, but according to reports, will produce its own phthalate.

In addition to the Acton plant, Dewey & Almy has its original plant at Cambridge, Mass., other plants at Adams, Mass.; Chicago, Ill.; San Leandro, Calif.; and two comparatively new plants at Lockport, N. Y., and Cedar Rapids, Iowa, where saran is extruded as Cry-O-Rap film, used particularly for meat and poultry packaging. The company has extended its merchandising field for Cry-O-Rap into the home. Bags made of this film are now sold at 6 for 89¢ in stores and recommended for home use as a protective wrapping for food, clothing, hats, silver, paint brushes, and so forth.

Plastisols

A NEW line of plastisols is now being offered by Rubber Corp. of America, 274 Ten Eyck St., Brooklyn, N. Y. These RC plastisols are available for slush molding, dipping of wire baskets and metal parts, and many other applications. They are formulated to meet the most rigid heat and light stability requirements. Rigid production control insures uniform quality, extended storage life, and stable viscosity. Rubber Corp. of America maintains a fully equipped laboratory and free consulting service which is available for the development of plastisols to meet customers' individual requirements.

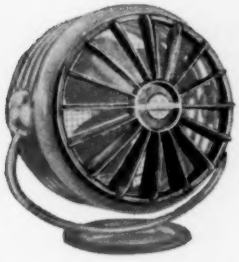
Large Diameter Tubing

AVAILABILITY of tubing up to 3 in. in diameter has been announced by Anchor Plastics Co., whose line of custom-made extrusions was previously limited to 1-in. diameter. The tubing can be specified in any of the cellulose plastics and in Aeroflex, the company's polyethylene. To assure maintenance of present delivery schedules, the firm has installed additional extrusion capacity at its plant at 533 Canal St., New York, N.Y.

One Way to Save Steel

A MOST interesting growth chart for plywood could be made for such things as trailers and railway freight cars. Some railroads have been using plywood liners for freight cars, and even exteriors on a small scale, for 15 years, but the biggest present possibilities are the Unicel type cars and trucks which use a preponderant amount of plywood and glued-wood sandwich type construction. The Unicel freight car, announced some months ago, will, for

another tough production problem solved! decorative, practical, large-area product



made in one-shot molding WITH HIGH-IMPACT

STYRON 475

Complex, decorative design and superior functional utility—both are achieved in these Westinghouse Jet Vanes (24 inches in diameter), made in a *one-shot molding* of Styron 475. The one-piece molding saves handling and assembly operations, cuts costs all down the line. And the final product also has beauty while performing the practical job of keeping the air flowing in a straight line as it comes out of the air circulator.

In this case the experience of the molder working for Westinghouse and the specialized knowledge of Dow's Plastics Technical Service combined to assure another successful application of Styron 475. This "working together," the pooling of the talents of the molder, the molder's customer and Dow, efficiently solves many production problems.

The **immediate availability** of Styron 475, plus such other advantages of the material as shock resistance, light weight, dimensional stability, and resistance to moisture means that this versatile plastic can help many different industries. Styron brand plastics are available in a wide range of *quality-controlled* colors and formulations.

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example, withstand 14 "humps" without damage in comparison to 10 for steel cars. However, if the ICC lives up to past performance, it may take years to get the Unicel car approved even though it saves 22,000 lb. of steel per car. The potential for all kinds of plywood freight cars could be 3000 a month in comparison to several hundred a month that are now being built.

Blow Molded Polyethylene Bottles

PROCESSES for blow molding polyethylene and other types of plastic containers and bottles have been developed by two firms, Royal Mfg. Co., Inc., 200 North Granite St., Prescott, Ariz., and Injection Molding Co., 3823 Independence Ave., Kansas City 1, Mo.

Royal is manufacturing bottles of from 1- to 16-oz. capacity in stock molds as well as custom work with private mold designs. The firm has complete facilities for printing and decorating the bottles and does its own tooling. These containers are produced on specially designed equipment by a company-developed process for which patent applications have been applied.

Injection Molding Co. is engaged principally in work with private molds and does not anticipate construction of any new stock molds (the company is currently in production with Boston round).

Polyester Laminating Resin

NEW application fields are opened up with the development of a polyester laminating resin which will withstand temperatures as high as 500° F. According to the manufacturer, Naugatuck Chemical Div., U.S. Rubber Co., Naugatuck, Conn., the heat resisting property of the resin, which is being marketed as Vibrin X-1047, is made possible by the use of a new chemical, triallyl cyanurate. Its physical and handling properties are comparable to other types of polyesters.

Most significant use of this new resin is expected to be its application as a structural material in the manufacture of high-speed aircraft and guided missiles. It is now being tested at the Wright Air Development Center, Wright Field, Ohio.

Laminates made with this resin and glass fabric retain a flexural strength of from 40,000 to 47,000 p.s.i. when exposed for as long as 200 hr. at 300° F. Flexural strength of over 30,000 p.s.i. is retained after 24-hr. exposure at 500° F.

Initially, the resin will be available for military applications, but Naugatuck Chemical is boosting production capacity in order to supply resin manufacturers for applications in the electrical, radio, and television industries.

Plastisol and Organosol Production

PRODUCTION of a broad line of plastisols and organsols has been started by Houghton Laboratories, Inc., Olean, N.Y., following expansion of its Olean and Smethport, Pa., facilities. Marketed under the trade name of Hysol, these plastisols and organosols are used as coatings for coils, bus bars, paper and cloth, staple fibres, ducting, and pipe.

Acrylic Cements

TWO bonding agents for cementing acrylics are being made by Schwartz Chemical Co., Inc., 326 W. 70th St., New York, N.Y., which adopted the sale and manufacture of the products from Du Pont after the latter discontinued production. Called H-94 and H-114, the products are free-flowing, water-white solvent cements which are said to produce efficient, optically clear, bubble-free joints and laminations. Both cements are applied to acrylic objects by brush, dropper, or hypodermic syringe. Large surfaces can be joined by the standard "soak" method.

Fibrous Glass Honeycomb Material

A SPECIAL honeycomb material called Multiwave, which is made of impregnated fibrous glass, has been announced by Narmco, Inc., Costa Mesa, Calif. Multiwave is an improvement over former honeycomb construction materials in that it can be used to form compound curves when laminated with metal or other materials in sandwich type construction, whereas previous products were limited to flat or straight curved surfaces. This flexibility is due to a special shape used in the cells of the honeycomb material.

Multiwave is expected to have many applications in the aircraft industry as well as in other fields. Multiwave cores can be used between layers of metal, plastic, and other materials to combine lightness and strength with heat insulating and sound deadening qualities in surfaces of any shape.

Ester Production

COMMERCIAL volume production of propylene glycol monoricinoleate, marketed under the trade name of Flexricin 9, has been announced by The Baker Castor Oil Co., 120 Broadway, New York, N. Y. Modifications of this ester are also manufactured as Flexricin 10, which offers a price advantage over the former product. These esters are available in regular grades for plasticizers, hydraulic brake fluids, cosmetics, and other purposes.

Unit for Wet-Strength Resins

OPENING of a new unit in Savannah, Ga., for the production of two wet-strength resins for paper—Kymene 138 and Kymene 234—has been announced by Hercules Powder Co. Both resins impart strength to paper products, particularly those which encounter high moisture conditions. Among the products incorporating the new resins are toweling, maps, V-board, blue prints, and paper bags.

Plasticizer Plant

EXPANDED facilities for producing tri (2-ethylhexyl) phosphate, or "Flexol" plasticizer TOF, which is needed for military and defense purposes are being constructed at the South Charleston, W. Va., plant of Carbide and Carbon Chemicals Co. A Certificate of Necessity has been granted for the construction of this unit, and production, expected to begin before the end of 1952, will double the plant's capacity.

This plasticizer provides good flexibility at low temperatures when incorporated in plastic or rubber and at the same time provides resistance to water, weather, and mildew. Vinyls compounded with this plasticizer are fire-resistant. These properties have made the use of this plasticizer essential in military and

NEW REPORT to management answers 12 questions your customers want to know about PLASTICS

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defense applications such as jacketing for special communication cable, coated cloth for Arctic tenting, and rubber gaskets used by the Navy.

New Plant in Calif.

CONSTRUCTION of its third manufacturing plant at Los Angeles, Calif., has been started by The Swedlow Plastics Co. The 36,000 sq. ft. plant, located on a 3-acre site, brings Swedlow's manufacturing facilities in that area to a total of 70,000 sq. feet. The new unit will also contain the company's general offices.

Swedlow Plastics Co. manufactures low pressure laminates and custom fabricated sheet plastics, and specializes in aircraft glazing.

Polyethylene for Shipping Acid

A SHIPMENT of corrosive batttery electrolyte in polyethylene bottles of capacities up to 1 qt. has been approved by the Interstate Commerce Commission, according to a press release from Plax Corp., Hartford, Conn., who has been testing such bottles for this purpose. The Plaxpak quart bottle is made with a lip to facilitate the pouring of acids. It is available in a 38-mm finish with a buttress-type thread and cap of polyethylene.

Four New Organic Chemicals

EXPERIMENTAL quantities of four new organic chemicals for research work have been made available by the manufacturer, Heyden Chemical Corp., 393 Seventh Ave., New York, N. Y.

First is 5-chlorosalicylic acid, which is suggested as a carrier in the dyeing of new synthetic fibers, such as Dacron, Orlon, and Dynel.

The second product is meta hydroxybenzoic acid, offered for use as an intermediate in preparing fine chemicals.

Methylene-di-o-cresotinic acid is suggested for use in the production of specialty dyestuffs and resins for surface coatings and printing inks.

Fourth compound is dipentek diformal which is recommended as a resin ingredient.

A joint announcement by Heyden and Shawinigan Chemicals Ltd. has named St. Maurice Chemicals Ltd., Montreal, Canada, to carry cut their joint program of building a $2 million plant at Varennes, Quebec, for the manufacture of 30 million lb. of formaldehyde and 3 million lb. of pentaerythritol annually. The Varennes unit is the first in Canada to produce pentaerythritol, which is used as a base in quick-drying, weather-resistant paints, varnishes, and lacquers.

Research Laboratory

CONSTRUCTION of a new $365,000 research laboratory has been started by the Borden Co.'s Chemical Div. in Philadelphia, and is expected to be completed by June, 1952. Research at the new facility will spotlight such chemical products as synthetic resins, coatings, and binders, as well as the development of resinous materials derived from furfural, phenol, and resorcinol, ammonia in the form of urea and methanol, formaldehyde, and vinyl polymers and proteins.

Nylon Warp Sizing

PRODUCTION of a textile finish, designated Polyco 437, has been announced by American Polymer Corp., 101 Foster St., Peabody, Mass., as a base for nylon warp sizes. Polyco 437 is an aqueous solution of polyacrylic acid which is easily diluted with tap water and removed after weaving by scouring. The manufacturer suggests its use on yarns for tricot knitting, spun nylon knitting, and weaving.

Low Pressure Laminating Material

IMPREGNATION of glass fabric with General Electric Co.'s Permafil resin results in the production of a tacky low-pressure laminating material that permits molding layups to be made without recourse to fastening devices. Permafil impregnated glass cloth is being marketed by Fabricon Products, Inc., 1721 Pleasant Ave., River Rouge, Mich., as Phenopreg LP-502.

The material is being used for low-pressure molding of aircraft tooling jigs and fixtures, and its use is being considered for automobile and airplane prototypes. Molding is done at about 300° F. under pressure of from 15 to 75 p.s.i. Layups can be made over wood or plaster forms and molded by the vacuum bag method. Matched metal die molding may also be employed. The molded parts have high mechanical strength, good moisture and chemical resistance, as well as excellent electrical properties.

Protective Coating for Acrylic

A REPLACEMENT for protective masking tapes on acrylic products during cementing operations is CD Strip A, a bright red, fast-setting strippable coating produced by Chemical Development Corp., Danvers, Mass. The surface to be protected is dipped in or painted with CD Strip A, and the pieces can be stored in two or three minutes after coating. After the cementing operation, the coating and any excess cement is peeled off. The manufacturer recommends the use of this coating particularly with irregular shaped articles or wherever masking tapes are difficult to apply.

COMPANY NOTES

Automatic Plastic Molding Co. has moved to new quarters at 830 Bancroft Way, Berkeley 2, Calif.

Consolidated Products Co., Inc., which handles used equipment for the chemical and process industries, has elected **A. M. Kahn** chairman of the board; **Herman Kahn,** president, and **M. I. Cowen,** treasurer.

Pearl Engraving Corp., 36 West 29 St., New York, N. Y., has announced the completion of new facilities for engraving on plastics, hard rubber, or metal.

Monsanto Chemical Co. has announced personnel changes in its Plastics Div.: **William Fitzgerald** has been assigned to thermosetting molding powder sales and **Stanley Melvin** to thermoplastic molding powder sales in the Chicago area; **H. Walter Miller** has been transferred to Springfield to handle thermoplastic molding powder sales in the New England area; and **Winston Richter** has been assigned to the Springfield office to handle special sales work on all products.

The Watson-Stillman Co., Roselle, N. J., has appointed **Adolph J. De-**

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Matteo as chief engineer and **Jackson Kemper** as general manager of sales, **Distributor Products Div.**

Frank W. Egan and Co. has added a manufacturing plant to its Bound Brook, N. J., facilities. The new property is adjacent to the present buildings on Lincoln Blvd. The increased capacity will be used for manufacturing and assembling Egan machines and equipment for the plastics and paper converting trades.

Lakeside Plastics Corp. has been formed in Manitowoc, Wis., for the manufacture and fabrication of plastics materials. A capital stock issue of 15,000 shares of common at a par value of $10 per share has been authorized by the state. Incorporators are **Walter B. Longacre, E. F. Menske,** and **John M. Spindler.**

The Hydraulic Press Mfg. Co. has moved its Chicago office to 3058 Peterson Bldg., Peterson Ave. **Don C. Youngblood** continues to head the office.

Reed-Prentice Corp. has opened a branch sales office at 2842 West Grand Blvd., Detroit, Mich. **Iver J. Freeman,** who joined the firm six years ago, heads the new office.

Glass Fibers, Inc., Toledo, Ohio, has purchased controlling interest in the **Vibradamp Corp.** with headquarters in Los Angeles and plants at Los Angeles and Santa Clara, Calif. The newly acquired company utilizes lightweight glass wool, a product of Glass Fibers, Inc., in the manufacture and fabrication of specially designed shock mounts, vibration mounts, and other products for defense weapons as well as commercial applications.

The company also announces the election of **F. J. Solon, Jr.,** as vice president, advertising and public relations, and **Raymond W. Capaul** as vice president and general sales manager. Mr. Solon joined the firm in 1947; Mr. Capaul arrived a year later.

Taylor Instrument Companies has announced the election of **Raymond E. Olson** as president. He succeeds **Lewis B. Swift** who was named chairman of the board. **Frank S. Ward** replaces Mr. Olson as general sales manager, and he is succeeded as industrial sales manager by **Albert J. Fleig.**

Godfrey L. Cabot, Inc., has announced the following appointments to its Research and Development Dept.: **Dr. B. Boonstra, James C. MacKenzie, R. E. Dobbin,** and **R. N. Secord.**

Celanese Corp. of America has announced the sale of its **Vimlite Dept.** to **Arvey Corp.,** Chicago, Ill. Vimlite, a translucent, semi-rigid plastic coated wire mesh product, is used as windbreaks, scaffold protection, and partitions, among other applications.

The company also announced the appointment of **Leo Birzstein** as field processing engineer for its **Plastics Div.** and the promotion of **E. F. Elbin** to district manager in the Southwest area for the **Chemical Division.**

U. S. Rubber Co., has named **Gregg T. Ward** general sales manager of the **Footwear and General Products Div.** and the promotion of the following personnel within that division—**C. William Pennington, Charles F. Kadlec,** and **Augustus C. Ware.**

General Electric Co. has announced the following appointments in its **Chemical Div.: Jerome T. Coe** is customer service supervisor for silicone products; **H. Arthur Howe** is manager of the Cochocton, Ohio, plant, with **Arthur T. Bourgault** succeeding him as manager of the phenolic products plant at Pittsfield; **Richard T. Walsh** is superintendent of the Cochocton plant; and **L. Vernon Larsen** has been named engineering section head of Textolite industrial and decorative laminates.

Le Conte Plastics Co., Inc., has announced the removal of its production and general offices to Merritt Road and Fallwood Parkway, P. O. Box 220, Farmingdale, N. Y. **Tooling, Experimental and Development Div.** will remain at 13 Post Place, Babylon, N. Y.

Gordon Chemical Co., Wilmington, Del., has started operation at its new Wilmington plant for the manufacture of urea formaldehyde molding compounds and allied products under the trade name of Uramol. New York City sales are directed by **L. P. Mendoza,** Flatiron Building.

Association of Consulting Chemists and Chemical Engineers, Inc., has appointed **Robert T. Baldwin** executive secretary and assistant treasurer and **A. B. Bowers** director of publicity and assistant executive secretary of the organization.

The Dow Chemical Co. has designated **Henry B. Weisl** and **John T. Rayburn** in its New York and Chicago offices respectively to handle sales of Styrofoam. This is the first time the company has assigned salesmen to handle this product exclusively and is a good indicator of the growth of this expanded polystyrene material, which is used for low temperature insulation, buoyancy, and display.

Hercules Powder Co. has opened a new sales office for the **Synthetics Dept.** in Carew Tower, Cincinnati. **Frank W. Beavers** has been transferred from the Cleveland office to be technical representative.

Owens-Corning Fiberglas Corp. has announced that **Ben S. Wright** has been reassigned as vice president in charge of purchasing and trade relations and **E. W. Smith** has been reassigned as vice president in charge of sales branches and training programs. **Edward J. Detgen** was named sales manager of the **General Products Division.**

Amplex Mfg. Co., 2325-31 Fairmount Ave., Philadelphia, Pa., has acquired all facilities of the Baker Plastic Co., 20 N. Springfield Road, Clifton Heights, Pa., and will operate them as the **Baker Div.** of Amplex. Plant operations will continue at the Clifton Heights plant, while all other activities will be transferred to Philadelphia. The company is now in production of Fiberglas reinforced polyester resins, making air ducts for helicopters. These facilities will be expanded. The company will also produce short runs of injection molded parts. Styrene copolymer and acrylic fabricating will be carried on at the Baker Div. plant in Clifton Heights.

Officials of the company are: president, **Adolph J. Kissileff;** sales manager, **Jack Benkin;** and general

PLASTISCOPE

manager of manufacturing, engineering, and development, **Elvin E. Baker, Jr.**

Sterling Electric Motors, Inc., announces start of production in its new $2,000,000 plant on an 11-acre site in Van Wert, Ohio. This new factory is rated as one of the country's most modern manufacturing plants for the production of gears, splines, and gear boxes. Sterling, manufacturer of Speed-Trol and Slo-Speed Electric Power Drives, is a large producer of variable speed and geared electric motors.

PERSONAL

John R. Hoover, formerly vice president of sales, has been elected president of **B. F. Goodrich Chemical Co.** Mr. Hoover joined B. F. Goodrich Co. as a chemist in 1925 after his graduation from Harvard University, and began his sales career in 1932 when he became assistant sales manager of the rubber lined equipment department, of which department he was later made sales manager. In 1942 he assumed direction of plastics materials sales and, when B. F. Goodrich Chemical Co. was formed in 1944, Mr. Hoover was made general sales manager; he became sales vice president in 1945.

Mr. Hoover succeeds William S. Richardson, whose increased responsibilities as vice president of the parent company include the chemical firm.

Henry N. Lyons has been appointed manager of Technical Service by The **Barrett Div., Allied Chemical & Dye Corp.,** in the **Chemical Sales Section.**

Thomas J. Martin has been named sales manager of resins for **Monsanto Chemical Co.'s Plastics Division.** He had been on leave from Monsanto as Chief, Thermosetting Unit, Plastics Section, Chemical Div., National Production Authority.

Dr. Gordon M. Kline has been appointed chief, Organic and Fibrous Materials Div. of the National Bureau of Standards, succeeding **Dr. A. T. McPherson** who has been promoted to associate director of the Bureau. Dr. Kline, who is also technical editor of MODERN PLASTICS, was formerly assistant chief of the Division and chief of the Organic Plastics Section with the division; he will remain chief of the plastics section for the present.

Stuart G. Keiller has been named manager of Velon filament sales for **Firestone Plastics Co.** His headquarters are in the Empire State Bldg., New York City.

Richard E. Dunning has been named production superintendent for all coatings for plastics produced by **Bee Chemical Co.** He was formerly with Bjorksten Research Laboratories.

Charles F. Hauck has been named manager of sales promotion of the **Chemical Plants Div., Blaw-Knox Co.**

Ed McBride, formerly a Plastics Div. salesman for Monsanto Chemical Co., has joined **Federal Telephone & Radio Corp.,** Clifton, N. J.

Van A. Bunting has been appointed Contracts Manager of the Youngstown, Ohio, division of **Swedlow Plastics Co.,** manufacturer of low pressure laminates and custom fabricator of sheet plastics.

Petrus W. Meyeringh, vice president, director, and member of the executive committee of **Hercules Powder Co.,** has announced his retirement. He has been associated with the company for 30 years.

Paul Slaughter, formerly district manager of their Cleveland office, has been appointed sales manager of the **Taylor Fibre Co.,** Norristown, Pa., replacing B. R. Bryant, who recently resigned.

Dr. Emil Ott, director of research, **Hercules Powder Co.,** was awarded the first Honor Scroll of the Pennsylvania Chapter, **American Institute of Chemists,** for his untiring efforts in promoting the free exchange of ideas among scientists. Dr. Ott is a leading authority on high polymer and cellulose chemistry.

R. J. Savage, formerly with Owens-Corning Fiberglas Corp., has become assistant general manager of **Parmelee Plastics Co.,** 1215 McGee St., Kansas City, Mo.

Deceased

John F. Segelcke, sales manager of the **Organic Acids and Plasticizers Dept.** of **American Cyanamid Co.'s Industrial Chemicals Div.,** died suddenly on December 1. Mr. Segelcke first became associated with the organization in 1921.

MEETINGS

Feb. 21-22—Society of the Plastics Industry (Canada), Ltd., 10th Annual Conference, Royal York Hotel, Toronto.

Mar. 3-7—American Society for Testing Materials, Spring Meeting and Committee Week, Hotel Statler, Cleveland, Ohio.

Mar. 11-14—Society of the Plastics Industry, Fifth National Plastics Exposition, Convention Hall, Philadelphia, Pa.

Mar. 16-19—American Institute of Chemical Engineers, Atlanta Biltmore Hotel, Atlanta, Ga.

Mar. 22-Apr. 6—Chicago International Trade Fair, Navy Pier, Chicago, Ill.

Mar. 30-31—Packaging Machinery Manufacturers Institute, Semi-Annual Meeting, Hotel Dennis, Atlantic City, N. J.

Apr. 1-4—National Packaging Exposition, 21st Annual Conference, Atlantic City Auditorium, Atlantic City, N. J.

Apr. 9-11—Society of the Plastics Industry, Seventh Annual Technical Session, Reinforced Plastics Div., Edgewater Beach Hotel, Chicago, Ill.

May 11-14—American Institute of Chemical Engineers, French Lick Springs Hotel, French Lick, Ind.

June 9-21—International Organization for Standardization, Triennial Meeting, Columbia University, New York, N. Y.

June 23-25—Forest Products Research Society, Sixth Annual National Meeting, Milwaukee, Wis.

June 23-27—American Society for Testing Materials, 50th Anniversary and Annual Meeting, Hotels Statler and New Yorker, New York, N. Y.

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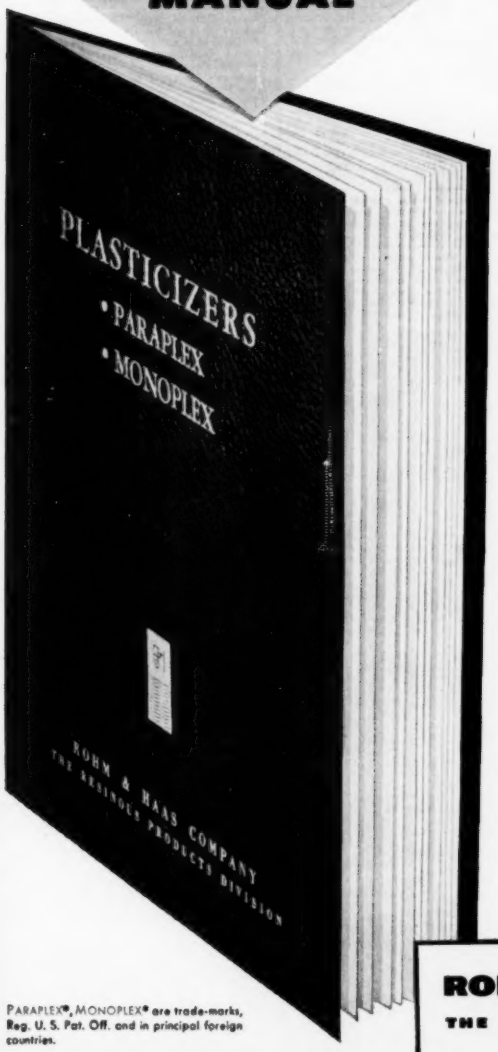

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PARAPLEX G-50—Intermediate molecular weight polymer for film sheeting and coated fabric. Good resistance to migration and extraction, improved handling characteristics.

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EMPLOYMENT • BUSINESS OPPORTUNITIES • EQUIPMENT (used or resale only)

MACHINERY and EQUIPMENT FOR SALE

FOR SALE: 50 Ton Stokes Presses & Pump. 200 Ton W.S. Hobbing PRESS, 300 Ton W.S. PRESS 24 x 20 Platen, 175 Ton H.P.M. PRESS 30 x 30 Platen, 150 Ton Farrel PRESS 30 x 30 Elec. Plates. 140 Ton W.S. PRESS 23 x 17 Platens, 85 Ton Stewart Bolling PRESS 20 x 20 Platen, 50 Ton Elmes PRESS with 18 x 18 Elec. Plates, 75 Ton W.S. PRESS 15 x 15 Platen, 75 Ton Adamson PRESS 20 x 20 Platens. Laboratory presses, Accumulators, Platen and Oil Pumps. AARON MACHINERY CO., INC. 45 Crosby St., N.Y.C.

FOR SALE: Quick delivery Rubber and Plastic Equipment. Farrel 16" x 48", and 15" x 36" 2 roll rubber mills. New 4" x 12" & 6" x 16" Lab. Mixing Mills and Calenders. Other sizes up to 84". Royle #½ and #2 extruders, also other sizes. 180 ton F.B. Molding Press, 20" x 20". Francis 175 ton 24" x 18". W. S. 115 ton 24" x 24". Also presses Lab. to 1500 tons from 12" x 12" to 48" x 48". Hydr. Oil Pumps Watson Stillman Hor. 4 plgr. 1½" & 2½ x 4" H&L Pressure pump. HPM 10 GPM 2700 lbs. Elmes Hor. 4 Plgr. 5 & 8 GJM 4500 lbs. & 5500 lbs. Hydr. Accumulators. Stokes Automatic Molding Presses. Rotary & Single punch Tablet Machines ¼" to 3". Injection Molding Machines 1 oz. to 32 oz. Baker Perkins jacketed mixers 200 & 9 gal. Impregnating units. Ball & Jewell & Leominster Plastic Grinders. Mikro Pulverizers 2 DH, 10 HP & other sizes. Heavy duty mixers, grinders, pulverizers, gas boilers etc. Partial listing. We buy your surplus machinery. Stein Equipment Co., 90 West Street, New York 6, N.Y. Worth 2-5745.

We handle hydraulic presses, pumps, and power units of all sizes. Write us your requirements and we will try to help you. We find it impossible to list our equipment in this classified column due to the fact that the equipment is sold before ad is published. For those who seek action look in the New York Times under the Machinery and Tool Column for our regular Sunday Special. Hydraulic Sal-Press, Inc., 386-90 Warren Street, Brooklyn 2, N.Y. MAin 4-7847

FOR SALE: Thermex Preheater, Model 2P; Airtronics Preheater, Model D E; Airtronics Preheater, Model C B. Like new. AARON MACHINERY CO., INC. WOrth 4-8233, 45 Crosby St., New York 12, N. Y.

SAVE WITH GUARANTEED REBUILT EQUIPMENT — HYDRAULIC PRESSES, 24" x 24", 18" ram 315 tons; 24" x 56", 450 ton multiple opening; 24" x 24", 16" ram, 250 tons; 24" x 24", 12" ram, 170 tons; 24" x 42", 3—12" rams, 340 tons, 42" x 42", 16" ram, 250 tons; 36" x 36", 12" ram, 141 tons; 20" x 18", 10" ram 118 tons; 20" x 20", 10" ram, 118 tons; 19" x 24", 10" ram, 78 tons; 22' x 15', 8' ram, 75 tons; 27" x 21", 8" ram, 75 tons; 15" x 15", 8" ram, 75 tons; 12" x 12" 7½" ram, 60 tons; 12" x 12", 6½" ram, 50 tons; 8" x 9½", 4½" ram, 20 tons; 16" x 16", 3½' ram, 12 tons; Laboratory Presses; 10 ton Carver 6" x 6", Watson Stillman 30 ton, 6" x 6"; Laboratory Mills and Calenders (NEW) M. D.; THROPP Mill 16" x 40" M. D.; NEW DUAL PUMPING UNITS, all sizes; Extruders; Royle Rubber #2, Royle Plastic #1, PREFORM PRESSES, Stokes T. Colton, 5½ T and Stokes DD84 with Reeves Drives, also Mixers, Vulcanizers, Accumulators, etc. Universal Hydraulic Machinery Co., Inc. 285 Hudson Street, New York City 13, N. Y.

FOR SALE: 1 Stokes DD2 Rotary Tablet Machine, Vari-Speed Drive and motor; 1—Farrel 16" x 42" Rubber Mill complete with drive and 75 H.P. Motor; 2—Ball & Jewel #2 Rotary Cutters, 50 H.P. Motors. Also Grinders, Extruders, Compression and Injection Molding Presses, Mixers, etc. Send us your inquiries. Consolidated Products Co., 13-14 Park Row, New York 38, New York.

FOR SALE: 4-oz. Impco Injection Molding Machine complete with motor. All controls including Nylon equipment. Purchased new this year. Run less than 60 days. F. J. Kirk McIlding Co., Inc., Clinton, Mass. Phone: 1871.

FOR SALE: One HPM Injection Molding Machine built 1946, 4 oz. $5,000, $2,000 down, machine operating daily. Jim Robbins Company, Detroit, Hazel Park, Michigan. Phone, Jordan 4-6634.

FOR SALE: Complete wood flour mill. Capacity 10 tons per 24 hours, using nearby supply of pine and poplar. For further particulars address Box 1358, Modern Plastics.

FOR SALE: Injection Presses: 4, 9, 16 oz. HPM, 12 oz. Reed, 8 oz. Watson, 22 oz. Impco, 2 oz. DeMattia, 1 oz. Van Dorn. Extruders: 1" Benchlab NRM. Scrapgrinders, Ovens, 250 Tons Transferpress, 50, 250 & 400 tons Compression Presses. 2— 3KW Thermail Preheaters. 1—250 Tons, 10 Plat. 26x28" Laminating Press. Preformpresses: Colton E, Stokes T, Kux 60 B & 65 B. 1—Nash Rotary Edger. 2—Embossing Calenders 61" wide. 1—Sheridan Embossing Press. 1—Patterson Stainl. Steel 8½ Cu. Ft. Conical Blender. 1—7½ HP Vacuum Pump. Large Vacuum Deepdraw press-assembly List your surplus equipment with me. Justin Zenner, 823 W. Waveland Ave., Chicago 13, Ill.

FOR SALE: 6 Rotary Pellet Presses: Kux model 25 (21 punch and 25 punch); Stokes D-3 and D-4. Read Co. 250 gal. heavy duty double arm sigma blade jacketed mixer, stainless steel. PERRY EQUIPMENT CORP., 1429 N. 6th St., Phila., 22, Pa.

FOR SALE: Hand engraved hubs suitable for injection molding button and jewelry molds in various shapes any reasonable price accepted. Reply Box 1365, Modern Plastics.

FOR SALE: No. 1 John Royle extruder, cored for oil heating, 2" stainless steel screw, 30" long Xalloy lined cylinder, and complete with 7½ HP variable speed motor drive, jacketed swing head, agitated feed hopper. Practically new and in perfect condition. Reply Box 1369, Modern Plastics.

FOR SALE: Ball & Jewell #1½ S.S. Rotary Cutter, Direct Connected to 40 HP 3 Ph. Motor. SKF Bearings. Laboratory 7" x 7" 2 Roll Mill. W&P Mixers, Jktd., From 5 Gals. to 300 Gals. Also Vacuum Cover. You Can BANK on Equipment Clearing House, Inc., 289 10th Street, Brooklyn 15, N.Y. South 8-4451.

INJECTION MOLDING MACHINES

1-Oz. Van Dorn, Model H200, 1947	Offers
1½-Oz. Impco, very good cond. (2)	7,500ea.
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4-Oz. REED, ser. #57450cl; 15 HP 3/60	$9,700
4-Oz. Watson Stillman, new, #9730cl	$9,950
6-Oz. REED, W&S, 1942up, Mod. 10-D	$6,500up
8-Oz. REEDS, Several avail. '42up	$8,000up
8-Oz. LEOMINSTER, ser. #140cl, excel.	$8,500
8-Oz. Lesters 1947, very good cond.	$11,000up
9-Oz. H.P.M. Mod. 200-89, good cond.	$5,950
16-Oz. IMPCO, REEDS, HPM, W&S	$15,000up
22-Oz. REED, 1946; Mod. 10-H. (2)	$19,500up
32-Oz. IMPCO & REED, 1949 & up	$26,000up

EXTRUDERS

HARTIG 3½", Model 500, good cond.	$4,450
HARTIG 1¼", electric heat; 15 HP G.E. motor	$3,500
NATIONAL 2½", lats, oil heated, good	$6,500

HYDRAULIC COMPRESSION PRESSES

1000 T. BIRDSBORO, 18" st. 28"x29"	$9,950
450 T. H.P.M. new '46 w/turbo	Offers
250 T. SOUTHWARD, 18"; 24x24" platens	$2,975
350 T. H.P.M. '46; self-contained	$9,500
275 T. W&S, platens 24x55"; 8" stroke	$2,975
240 T. Hardinge Platens 24x30", 12"	$7,000
225 T. W&S angle type; 18x18", 14x22	$4,000
200 T. Farrel 14" ram, 24x24 platens	$1,750
200 T. Standard Platens 44x44"	Offers
170 T. BURROUGHS Transfer, 14" stroke	$1,850ea.
75 T. Standard '40 vertical & horiz.	$1,950
50 T. W&S, & Johnson, others	$650up
Several 75 ton up; 24 x 24 Platens up; Adamson & Farrel, etc.	Offers

MISCELLANEOUS

Robinson Stock Grinder, 50 HP motor	$3,000
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Huskey #6 Marking machine	$950
Two-(2) 16 x 42 Rubber Mills	Offers
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Farrel Two Roll Mill 16 x 42	$3,975
Farrel 16"x40" endcap rubber mill	$5,625
Wilson Snyder Pump 3200# 40 HP, good	$4,000
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Grunder Hammer Mill type plas. grndr.	$1,200
Ball & Jewel #2½ plastic grinder	$3,000

EVEREADY SUPPLY CO. E. J. McCallum, Jr. 805 Housatonic Ave. 4-9471 Bridgeport, Conn.

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Colton 2 and 3 RP Rotary Tablet Machines. Mikro 1SH, 3TH, 4TH Pulverizers, Jay Bee Schutz O'Neill Mills.
Baker Perkins & Readco Heavy Duty Steam Jacketed, Double Arm 50, 100, 150 gal. Mixers.
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Day and Ross Pony Mixers 8, 15 gal. caps. Hobart & Read Vertical Mixers. from 15 to 120 quart, with removable bowls.
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Package Machy. FA, FA2, Miller, Hayssen 3-7, Scandia Auto. Cellophane Wrappers. This is only a partial list. Over 5000 machines in stock—available at tremendous savings. Tell us your machinery requirements.

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WANTED: Will buy plastic injection machine and plastic molds, all sizes. Please advise us what you have to offer. Also interested in buying Polystyrene. Will pay cash. Reply Box 1354, Modern Plastics.

WANTED FOR EXPORT: 1 and 2 oz. Injection Machines. Please state make, model, condition and price. Reply Box 1368, Modern Plastics.

WANTED: A 1, 1½, or 2-ounce Van Dorn semi-automatic injection press. Cash or tie-in deal. Relieve your expensive floor space for a larger machine. Do away with small-part, short-run nuisance. Please send details including price and location. Reply Box 1373, Modern Plastics.

WANTED! WANTED! WANTED! INJECTION MOLDING MACHINES, AND PRESSES, ALL SIZES. ALSO ANY OTHER PLASTIC OR HYDRAULIC MCHNRY. Superior Machine Tool Co., 803 Housatonic Ave. Bridgeport, Conn. 5-5890.

MATERIALS FOR SALE

We wish to sell 3000 pounds of nylon molding powder. FM 10001—Natural—Virgin material in sealed cans and cartons. Material was recently purchased. F.O.B. Glendale, New York. Reply Box 1359, Modern Plastics.

BUY—BARTER—SELL: Phenol—Phthalic—Maleic—Glycols—Titaniums—Zinc Oxides—Hydrosulfite — Bichromates — Ethanolamines — Pine Oil—Benzol—Dyes—Colors, etc. CHEMICAL SERVICE CORP., 90-04 Beaver St., New York 5, N.Y.

FOR SALE: Cellulose Acetate Molding Powder, shell, reground 5000 pounds, white 2000 lbs. Ethyl Cellulose assorted colors, 5000 lbs. Elastomeric Vinyl clear 20,000 pounds, assorted colored clippings 15,000 pounds. Reasonably priced. Reply Claude P. Bamberger, Inc., 152 Centre St., Brooklyn 31, N.Y. Main 5-5553. Not connected with any other firm of similar name.

(*Continued on page 214*)

CLASSIFIED ADVERTISING

(Continued from page 212)

LUCITE—PLEXIGLASS—GLACITE SHEETS —CAST RODS Always in stock—we deliver. PLASTICS GLASS CORP., 33 Ave. P., Newark 5, N. J., Mu 7-6477.

MATERIALS WANTED

WANTED: Plastic scrap such as Cellulose Acetate, Vinyls, Acrylic, Ethyl Cellulose, Polystyrene, Butyrate, etc. We also buy surplus inventories of molding powder or grind, clean and reprocess your own scrap. Claude F. Bamberger, Inc., 152 Centre St., Brooklyn 31, N. Y. Tel. Main 5-5553. Not connected with any other firm of similar name.

WANTED: PLASTIC Scrap or Rejects in any form. Acetate Butyrate, Polystyrene, Acrylic, Vinyl Polyethylene, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding, magnetizing and compounding. Reply Box 1350, Modern Plastics.

WANTED: Plastic Scrap, Rigid Vinyl, Cellulose Acetate, Polystyrene, Polyethylene, Butyrate, Custom grinding, magnetizing, compounding, and straining of contaminated plastics. Franklin Jeffrey Corporation, 1671 McDonald Avenue, Brooklyn, N. Y. ES 5-7943.

WANTED: PLASTIC SCRAP or REJECTS in any form: Cellulose Acetate, Butyrate, Polyethylene, Polystyrene, Vinyl, Acrylic and Ethyl Cellulose. Reply Box 1351, Modern Plastics.

SURPLUS UREA MOLDING POWDER WANTED. Reply Box 1357, Modern Plastics.

WANTED: By injection molder—Polystyrene molding powder in any form: scrap, reground, mixed colors, surplus virgin, etc. will purchase on contract basis if desirable. Send samples and best quotations to Waldor Products Molding Co., 132 Mallory Ave., Jersey City, N.J.

BUTTONS WANTED: Garment buttons mixed as to size, design and color. No junk. State price per lb. in quantities to 5 tons. Include few representative samples, f.o.b. point, terms, etc. Reply Box 1364, Modern Plastics.

MOLDS FOR SALE

FOR SALE: Household Gadget, patented twin stick sucker plastic mold for home mix cool aid, ice cream and sherbets; year round chain store and premium item, possibility of gadget being demonstrated on TV as premium for home mix ice cream by large firm. For Sale or License. Reply E. M. Kenneary, 1648 E. 77th St., Cleveland 3, Ohio.

FOR SALE: Two Injection molds. Made for Crown Moldmaster. One—4 oz. molds base for stork. One 6 oz. molds stork. With molds go excellent contact for selling item. Plant burned (Molds were not in it at time). Unable to rebuild. Also have small barrel mold (no base). Best offer takes lot. Sample: $1.00. Reply L. Roy Neal, 63 Cambridge Avenue, Rochelle Park, N.J.—Phone FAir Lawn 6-4972.

MOLDS WANTED

WANTED: Large foreign molding company wants injection molds for 4 to 12 oz. machines. Particularly interested in toys, household articles, combs, etc. Delivery and payment in New York. Reply Box 1363, Modern Plastics.

MOLD WANTED for injection molding. We will buy one mold or a complete line or series of molds for finished resalable items. Housewares, toys, novelties, etc. Will also buy molds for industrial parts such as handles, knobs, drawer pulls, gears. All items for resale in U. S. A. Send detailed information to Victory Manufacturing Company, 1722 W. Arcade Place, Chicago 12, Illinois.

WANTED INJECTION MOULDS of stationery and school plastics items by responsible Chilean firm, for rental. All suitable guarantees offered. Willing to enter into continuous contractual arrangement with responsible American firm. Reply Box 1353, Modern Plastics.

WANTED: Plastic Molds—for 8 oz. Reed Prentice Machine. P. O. Box 59, Kent, Ohio.

HELP WANTED

WANTED: Sales representatives for phenolic resins (liquid types preferred.) Will consider commission basis arrangement or salary and commission both. Reply Box 1352, Modern Plastics.

COATING CHEMIST: Coating machinery manufacturer is desirous of obtaining services of chemist familiar with organosols, plastisols and hydrasols coating on webs and monafilaments. Must be able to provide compound data and actual runs on large scale pilot equipment. Familiar with nylon, dacron, similar synthetics and rubber and their treatments. To assume charge of laboratory on new process development. Excellent opportunity for proper advancement. University graduate preferred. Central states location. Send complete detailed background resume. Reply Box 1355, Modern Plastics.

CHEMISTS, CHEMICAL ENGINEERS, MECHANICAL ENGINEERS, TECHNICAL REPORT WRITERS, FOR RESEARCH AND DEVELOPMENT: Excellent opportunities for capable young graduates in process and product research and development in the laboratories of a progressive molder and fabricator of plastics. Experience desirable but not essential. In reply give full resume of education, experience and salary requirements to: VICTORY PLASTICS CO. Dept. M, HUDSON, MASSACHUSETTS.

Engineering Degree and experience in molding and extruding operation general thermoplastics. Will have full product engineering responsibility covering all plastic products manufactured. Salary open dependent on qualifications and experience. Products specifically in industrial rather than novelty field. Established company with plant located in North Jersey area. Send resume outlining pertinent details to Box 1356, Modern Plastics.

WANTED: Engineer with several years experience in production techniques and design practices of Polyester Fiber Glass Re-inforced Laminates. The job will entail supervision of all phases of this work in the Plastic Production Division of an established firm; including purchasing, production, engineering design, and customer relations. In reply, please state education, experience, and personal data. Write to Box 5037, Philadelphia 11, Pennsylvania; attention, Mr. C. B. Sheppard.

Extrusion plant in Metropolitan New York Area desires top notch man to assume full responsibility for entire production including die design and job setups in rigid and flexible materials. Excellent opportunity with established and growing concern. Give full details on background and salary desired. Replies confidential—our staff knows of this ad. Reply Box 1361, Modern Plastics.

Experienced man in plastics used by wire and cable manufacturers. To select, test and supervise materials used in extrusion and injection molding. Degree not necessary but experience is. Good future for the right man in the South with an established company. Salary plus profit percentage. Send complete experience and personal information including picture. Reply Box 1362, Modern Plastics.

COATER ENGINEER OR FOREMAN — Excellent opportunity for experienced man to assume responsibility over new department being set up in old, established firm. Experience necessary with organisols and plastisols. Reply stating all personal qualifications and business experience. All replies confidential. Reply 1367, Modern Plastics.

PLANT SUPERINTENDENT — ACRYLIC FABRICATION: Only thoroughly experienced man will be considered. Must have supervised fifty or more production men. Capable of designing all dies, jigs and fixtures for production. Submit resume in confidence. Reply Box 1372, Modern Plastics.

PLASTICS MATERIALS

Plastics raw materials manufacturer seeks experienced man for buying and selling. Write stating complete background, qualifications and salary desired. Replies held strictly confidential. Our employees know of this ad. Reply Box 1380, Modern Plastics.

WANTED: Plastics Engineer— Excellent opportunity in long established custom molding plant for experienced Plastics Engineer. Must be thoroughly acquainted with all commercially available Thermoplastics and Thermosetting materials; able to estimate and process new products and molds; trouble shoot on production problems; assist in organizing and supervising Engineering personnel. Position offers excellent working conditions, good salary, and opportunity to become part of management staff. When replying, please state all qualifications, age, experience, education and starting salary. Reply Box 1374, Modern Plastics.

PLASTICS MOLD AND PRODUCT ASSISTANT CHIEF ENGINEER: Familiar with Injection, Compression, Transfer molding and Extrusion; mold and product design; methods, costs and procedures; consult with customer. Location; near Boston, Mass. Salary; commensurated with ability. Exceptional opportunity for the right man. Please write complete experience, listing former employers, age, and salary requirements, to Box 1370, Modern Plastics.

We require the services of a Plastic Mold Designer whose background includes both Injection and Compression Molding. Must be capable in Product and Tool Engineering as well as estimating both production and tools. Please reply direct to Michigan Molded Plastics, Inc., Dexter, Michigan, giving a complete resume of background and qualifications.

WANTED BY EXPANDING EASTERN EXTRUDER

Plant Superintendent
Development Engineer
Color Matcher for Vinyls
Shift Foreman
Tool and Die Maker
Must be thoroughly experienced in all types of profile extrusion. Write all details to Box 1371, Modern Plastics.

WANTED—EXTRUSION EXPERT: Old established firm contemplates extruding plastic film. Require top grade man to set up complete plant from scratch and then take charge of production. Salary will be based upon experience and ability. Excellent opportunity for a capable individual. Reply Box 1377, Modern Plastics.

WANTED—SALES REPRESENTATION: For Custom Molding in Ohio, Michigan, Indiana and Pennsylvania and surrounding territory. On commission basis. Injection Molding and sheet fabrication only. Wide press capacity range. Experience with injection plastic molding and sheet fabrication preferred. Reply Box 1379, Modern Plastics.

SITUATIONS WANTED

B.S.Ch.E. Started in Plastics in 1929. Head of Application Development, leading company, for 17 years. Can do any possible problem required with Phenolics. Will match accomplishment record with anyone. Numerous very important firsts. Patents and literature on Phenolics and Polyesters. Also know related Teflon. Experienced in designing and erecting Plastic Plants. Reply Box 1360, Modern Plastics.

VINYL CHEMIST: Extensive experience in formulating, compounding, and color matching of calendered film and sheeting. Experience in production and quality control, gravure printing and heat sealing. Desire connection with aggressive concern in metropolitan area. Will consider allied fields. Reply Box 1366, Modern Plastics.

Administrator Available! 11 years experience: plastics consultant, product designer, and administrative positions. S.P.I. professional member. Doctorate work in plastics research. Presently employed—in charge of all personnel in large organization. Current company dissolving. Can my energy, enthusiasm, conscientiousness, experience be put to work in your concern? Age 33, Family. Reply Box 1378, Modern Plastics, or phone JErome 7-3567.

MISCELLANEOUS

FOR SALE: Long established plastics fabricating business completely equipped. Have large volume high priority orders on hand along with good volume civilian orders. Asking price $12,000.00 which includes machinery, orders on hand, good will, name, etc. along with complete sets of tools to produce proprietary line. Located in New Jersey. Reply Box 1376, Modern Plastics.

BUSINESS OPPORTUNITY WANTED: Chemical Engineer with substantial management and chemical experience in vinyls (organisols and plastisols) and thermoplastics will invest up to $20,000.00 and services for interest in going firm. Reply Box 1375, Modern Plastics.

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"Please recommend a material which will . . ."

"Our need is a plastic wheel that . . ."

"Do you know of a manufacturer who . . . ?"

". . . and how can we insulate it?"

"Who makes stock molded cookie cutters?"

"Where can I purchase a machine that . . . ?"

Each month, the Readers' Service Department of MODERN PLASTICS answers scores of questions for our readers. Questions range from simple requests for information about the manufacturer of a stock molded item to requests which demand detailed, technical answers.

With their extensive files, reference library and wide knowledge of plastics materials, machinery and procedures, the members of the Readers' Service Department can usually supply the information you request. In addition, the technical and editorial staffs of MODERN PLASTICS are at their disposal for attending to questions which are particular "sticklers." If you have any questions, feel free to forward them. There is no charge or obligation for this service. Address — Readers' Service Department, MODERN PLASTICS. A complete reply to your inquiry will be sent promptly.

MODERN PLASTICS

A Breskin Publication

575 Madison Avenue New York 22, N. Y.

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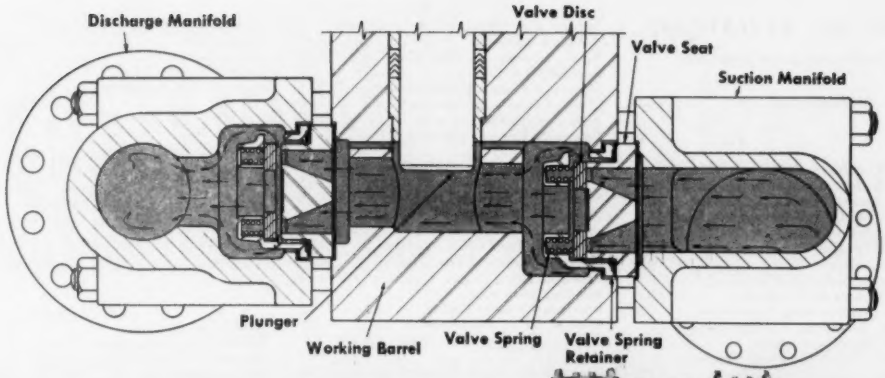
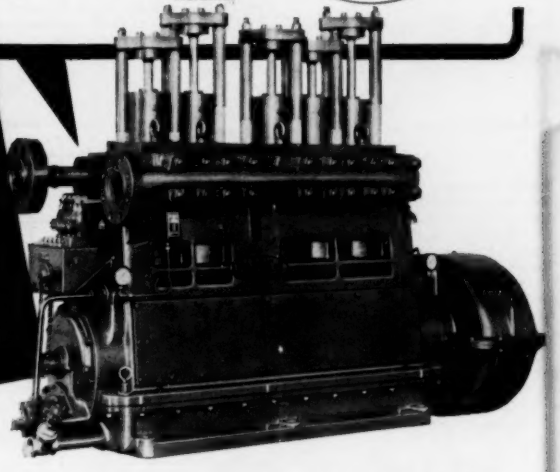


ENGINEERS: Check these points of Aldrich Direct Flow Design



Aldrich engineers eliminated two right-angle turns in the fluid-end. Now, liquid passes from suction to discharge manifold in a *straight line.* That gave the Direct Flow Pump its name, and set up a whole new concept of pumps, pumping, and pump maintenance. It all adds up as follows:

☐ **Increased operating speeds**—you get whatever volume and pressure you need *from a smaller, lighter, more compact pump.*

☐ **Sectionalized construction**—parts can be replaced at a fraction of the cost of a new fluid-end; also, parts can be made of stainless, bronze, Monel or other special materials—extremely important for corrosive fluid service.

☐ **Maintenance made easier**—no more tapered bores in the working barrel. Manifolds are *not* taken off but slide out on studs—affording room to *lift out* valves as complete units. Packing is easily renewed—note accessibility of stuffing boxes.

☐ **Interchangeable wearing parts**—available among 3, 5, 7 and 9 plunger pumps of same stroke size. This minimizes spare parts costs and inventories.

☐ **Changeable plunger sizes**—in many cases it is only necessary to add new plungers, glands, throat bushings and packing *to the same fluid-end.*

☐ **Drive direct**—by connection to synchronous engine type motor or internal combustion engine; also with integral speed reducer or V-belts.

Contact your Aldrich Representative . . . or write to us direct for complete details on 3", 5" or 6" stroke units.

THE ALDRICH PUMP COMPANY

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MODERN PLASTICS

575 MADISON AVENUE • NEW YORK 22, N.Y.

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Is Our Story—about YOUR Product

This brand new booklet, "Plastically Speaking", tells the whole story of the custom injection moulding methods and facilities at Worcester Moulded Plastics.

Every phase of custom moulding, from initial planning and die designing to final finishing and inspecting, is described in terms of meeting the customer's requirements — YOUR requirements.

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Custom Injection Moulding

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Gaskets by Johnson Plastic Corp., Chagrin Falls, Ohio

HERE'S another spot where versatile VINYLITE Plastics outperform all other older materials—in the lid seals of washing machines.

Beaten, battered, constantly exposed to water and to chemical detergents, these easily extruded seals of VINYLITE Brand elastomeric materials last a lifetime!

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You'll find these materials in the door gaskets of leading refrigerators, in lightweight, quality garden hose, in moisture- and chemical-resistant wire insulation. They're the preferred material of many manufacturers for extruded belts, welting, intravenous tubing, and molded light plugs, distributor cap nipples, vacuum cleaner bumpers, hair curlers, and a multitude of other products.

Why not find out how they can lower your costs, speed assembly, lengthen product life? Write today for the free booklet, "VINYLITE Resins and Plastics—Extrusion and Molding Materials." Address Dept. LH-7.

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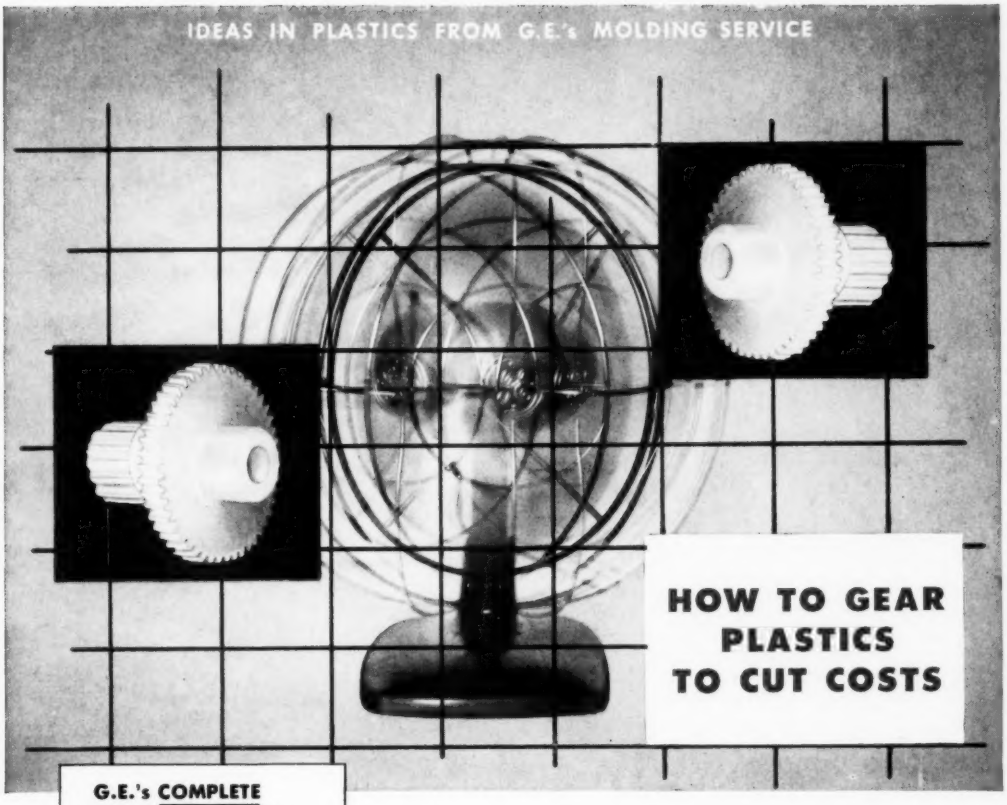
IDEAS IN PLASTICS FROM G.E.'s MOLDING SERVICE



HOW TO GEAR PLASTICS TO CUT COSTS

G.E.'s COMPLETE MOLDING SERVICE OFFERS YOU—

- Complete mold-making facilities
- Impartial material selection
- Injection presses from 3 to 208 ozs.
- Compression presses from 3 to 36 ins.
- Complete extrusion facilities
- Complete silicone rubber fabricating facilities
- Complete molded mycalex facilities

PLUS the benefit of 60 years' experience in designing, engineering and molding plastics parts.

These molded *plastics* gears, replacing *metal* in an oscillating fan, are an excellent example of how General Electric's *complete* plastics molding service can cut costs for customers—in this case, *by no less than 63%!*

Part of this substantial saving was accomplished by substituting a nylon gear and pinion, molded as a unit, in place of a steel pinion and laminated plastics gear which required hobbing, cutting and assembling. Besides reducing costs, the new plastics gears wear better and operate more quietly.

You can depend on General Electric's *complete* molding service for cost-saving ideas like this. Perhaps this example will suggest some use for molded plastics in *your* business. If so, G.E. will be glad to work with you. One of the world's largest plastics molders, G.E. has the "know-how" and facilities to produce your biggest jobs efficiently and economically.

For information, just write to General Electric Company, Section M-2, Chemical Division, Pittsfield, Massachusetts.

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